SEMESTER-I

Course Description:
Course Code: 24PSYVAC101
Course Title: VAC
Course Type: Value Added Course
Credit: 1
Total Hours: 30
Hours per Week: 2
Course Type: Value Added Course

Objectives

1. Understand the fundamental principles of psychological assessment and testing and counselling session.
2. Develop skills in administering, scoring, and interpreting psychological tests.
3.Write clear, concise, and well-organized psychological reports.
4. Integrate test results, case history, and MSE findings into reports.
This course has been designed to fulfil the
criteria set by NEP 2020 for Value Added Course (VAC).

Detailed Module
Session 1: Counselling and therapy session
5 hours.

Session 2: MSE
5 hours.

Session 3: Movie -psychological perspective
5 hours.

Session 4: Group Discussion
5 hours

Session 5: Movie -psychological perspective
5 hours.

Session-6: Report Writing
5 hours.

Mode of Evaluation: Practical (Using Log Book)

SEMESTER-II

Course Description:
Course Code: 24PSYVAC102
Course Title: Counselling skills-2
Course Type: Value Added Course
Credit: 1
Total Hours: 30
Hours per Week: 2
Course Type: Value Added Course

Objectives

1. Understand the fundamental principles of psychological assessment and testing.
2. Develop skills in administering, scoring, and interpreting psychological tests.
3.Write clear, concise, and well-organized psychological reports.
4. Integrate test results, case history, and MSE findings into reports.
This course has been designed to fulfil the
criteria set by NEP 2020 for Value Added Course (VAC).

Detailed Module
Session 1: Case History
5 hours.

Session 2: MSE
5 hours.

Session 3: Screening test-1
5 hours.

Session 4: Emotional Intelligence and interpersonal skills
5 hours

Session 5: Screening test -2
5 hours.

Session-6: Report Writing
5 hours.

Mode of Evaluation: Practical (Using Log Book)

Course Code	**23SOWVAC101**
Course Title	**LIFE SKILLS FOR SOCIAL WORK**
Credits	**1**
Lecture hours Hours/Week	**30** **2 hours per week**
Category	**VAC**
Semester	**I**
Regulation	**2023**

This course is designed to equip aspiring social workers with essential life skills necessary for effective practice in diverse settings. Through a combination of theoretical frameworks and practical applications, students will develop key competencies that enhance their ability to engage with individuals, families, and communities. This interactive course will include lectures, group discussions, case studies, role-playing exercises, and self-reflection activities. Students will engage in hands-on learning experiences that apply theoretical concepts to real-world scenarios.

Session 1: Introduction to Life Skills in Social Work

- Overview of course objectives and expectations
- Importance of life skills in social work practice
- Introduction to key concepts and frameworks

Session 2: Effective Communication

- Principles of verbal and non-verbal communication
- Active listening techniques
- Role-playing exercises to practice communication skills

Session 3: Building Empathy and Rapport

- Understanding empathy and its role in social work
- Strategies for connecting with clients
- Reflective exercises to enhance empathetic understanding

Session 4: Problem-Solving Techniques

- Steps in the problem-solving process
- Tools and frameworks for effective assessment

- Case study analysis to apply problem-solving skills

Session 5: Critical Thinking in Social Work

- Importance of critical thinking in decision-making
- Techniques for evaluating evidence and perspectives
- Group discussions on case scenarios

Session 6: Cultural Competence and Sensitivity

- Exploring cultural diversity and its impact on social work
- Strategies for culturally responsive practice
- Workshops on bias recognition and cultural humility

Session 7: Conflict Resolution Skills

- Understanding the nature of conflict in social work settings
- Techniques for constructive conflict resolution
- Role-playing scenarios to practice conflict management

Session 8: Self-Care Strategies for Social Workers

- Importance of self-care and burnout prevention
- Developing personal wellness plans
- Guided self-reflection activities

Session 9: Teamwork and Collaboration

- The role of teamwork in effective social work practice
- Building collaborative relationships with colleagues and community partners
- Group activities to enhance teamwork skills

Session 10: Advocacy and Social Justice

- Understanding advocacy in the context of social work
- Strategies for promoting social justice and equity
- Group discussions on current social issues and advocacy approaches

Session 11: Ethical Decision-Making

- Overview of ethical principles in social work
- Frameworks for ethical decision-making
- Case studies to explore ethical dilemmas

Session 12: Time Management and Organizational Skills

- Techniques for effective time management in social work
- Prioritizing tasks and setting goals
- Practical exercises to enhance organizational skills

Session 13: Resilience and Coping Strategies

- Understanding resilience in clients and social workers
- Strategies to build personal and client resilience
- Interactive activities focused on coping mechanisms

Session 14: Reflective Practice and Continuous Learning

- The importance of reflection in social work practice
- Techniques for self-assessment and growth
- Developing a personal learning plan

Session 15: Integration and Application of Skills

- Review of key concepts and skills learned throughout the course
- Final project presentations: Applying life skills in real-world scenarios
- Group discussion on future applications of life skills in social work practice

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Richayanti P Lepcha Signature:	Name: Dr. Brian Gomes Signature:	Name: Ranita Chakraborty Signature:

24HISVAC101
MUSEUM STUDIES
HOURS: 30
SESSION: 15

The syllabus provides a comprehensive overview of museum studies, covering various aspects of museum theory, practice, and management. It covers a wide range of topics in museum studies, from the fundamentals of museum history and ethics to practical skills like collection management, exhibition design, and technology integration. The inclusion of guest lectures, museum visits, and a final project presentation adds a hands-on and practical dimension to the course, allowing students to apply their knowledge in real-world settings.

Session 1: Discussion Introduction to Museum Studies
Overview of the course
History and evolution of museums
Types of museums and their roles in society

Session 2: Documentary on Museums as Cultural Institutions
Museums as cultural gatekeepers
Cultural preservation and representation
Ethics in museums

Session 3: Museum Collections and Exhibitions
Acquisition, accessioning, and deaccessioning
Care and conservation of collections
Object handling and documentation

Session 4: Guest lecture Exhibition Planning and Design
Design and curation principles interpretive techniques Visitor engagement and accessibility

Session 5: Museum Education and Public Programs
Educational roles of museums Program development and evaluation Outreach and community engagement.

Session 6: Museum Marketing and Promotion Digital marketing and social media
Public relations and branding

Session 7: Museum Ethics and Legal Issues
Ethical dilemmas in museums
Cultural property and repatriation
Copyright and intellectual property

Session 8: Museum Management and Governance
Organizational structures
Budgeting and financial management
Board governance and leadership

Session 9: Museums and Technology
Digital collections and archives preservation and accessibility
Virtual exhibitions and augmented reality

Session 10: Museum Evaluation and Visitor Studies
Evaluation methodologies
Visitor studies and feedback
Improving the visitor experience

Session 11: Museums and Diversity
Inclusivity and diversity in museum practice
Decolonization and restitution
Representation of underrepresented communities

Session 12: Curatorial Practices
Curatorial roles and responsibilities
Exhibition planning and research
Curatorial ethics

Session 13: Museums and Education
Educational program development
School partnerships and curriculum alignment
Accessibility and inclusion in education

Session 14: Cultural Heritage Preservation
Preservation of intangible heritage
Cultural heritage laws and conventions
Indigenous cultural heritage and protection

Session 15: Museum Careers and Professional Development
Job opportunities in the museum field
Networking and professional organizations
Resume building and interview skills

1. **Assessment**

Formative Assessment: 50 marks as per the Assessment & Evaluation Framework Document of Salesian College

i. *Summative Assessment*: 50 marks
   a) Five Short Questions to be answered out of eight given from lower order of RBT – (10 Marks, 2 marks each)
   b) Four Questions to be answered out of six given from the lower order of RBT
   c) Two Long Questions to be answered out of Four set from higher order of RBT – (30 Marks).
   d) Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (prepared by)	**Head of the Department (Checked and verified)**	**Dean (Approved by)**	**Subject Expert (Approved by)**
Name- Manisha Pradhan Signature	Name- Dr. Gouri Dey Signature	Name- Mr. Ravi Bhushan Singh Signature-	Name- 1. Prof Madhab Chandra Adhikary- 2. Dr. Sudash Lama- 3. Dr. Binayak Sundas 4. Mr. Soumendra Prosad Saha 5. Dr. Malay Saha

Course Code	**23HISVAC201**
Course Title	**Understanding the Heritage of Eastern Himalayan: North Bengal**
Credits	**1**
Lecture hours Hours/Week	**30** **2 hours per week**
Category	**VAC**
Semester	**III**
Regulation	**2023**

The Course focuses on the tangible and Intangible heritage of Eastern Himalayas, emphasizing the region of North Bengal. Heritage sites like Coochbehar Rajbari, DHR, and Toribori Monastery will be discussed thoroughly to engage students with the local heritage sites. Oral Traditions of Ethnic communities of North Bengal will be studied to ensure students understand the importance of the region's rich Intangible heritage.

Session 1- Understanding Heritage- Introduction

Session II and Session III- Tangible Heritage

Case Study of Coochbehar Rajbari

Session IV and Session V- Intangible Heritage

Oral Traditions of the Ethnic Communities of North Bengal.

Session VI and VIII- Heritage Sites of North Bengal

Case Study of Darjeeling Himalayan Railway

Case Study of Toribari Monastery.

Session IX and X - Conservation of Tangible and Intangible Heritage.

Session XI- Guest Lecture

Session XII- Challenges faced by Tangible and Intangible Heritage

Session XIII- Visit to the Centre of Himalayan Studies, University of North Bengal.

Session XIV- Visit to the Heritage Site

Session- XV- Exhibition

Course Faculty (prepared by)	**Head of the Department (Checked and verified)**	**Dean (Approved by)**	**Subject Expert (Approved by)**
Name- Signature	Name- Dr. Gouri Dey Signature	Name- Mr. Ravi Bhushan Singh Signature-	Name- 1. Prof Madhab Chandra Adhikary- 2. Dr. Sudash Lama- 3. Dr. Binayak Sundas 4. Mr. Soumendra Prosad Saha 5. Dr. Malay Saha

1. Course Description

Course Code	23BBAVAC101
Course Title	INTRODUCTION TO TOURISM
Credits	1
Total Session Hours	30
Number of Sessions	15
Course Type	VAC
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Growth, development, and recent trends in tourism.
Course Offered to	BBA
Regulation	2023
Course Overview	This course: a) Introduces tourism business, its forms and typologies. b) Enhance the knowledge of students in various areas of tourism industry. c) Equips with the understanding of impact of various factors in tourism
Prerequisite	Basic knowledge of tourism and tourists.
Course Objectives	A student will be able to: a) Understand the concept, importance, and types of tourism. b) Identify the composition and typology of tourism. c) Describe the recent trends in domestic and international tourism. d) Explain the growth and development of Tourism in India. e) Identify the economic, social, physical, and environmental impact in tourism

Course Content

Session	Session Details	Session Hours
Session I	Introduction to Tourism	**2**
Session II	Introduction to Tourism: Definitions, Nature and Scope of Tourism	**2**
Session III	Importance and Components of Tourism.	**2**
Session IV	Typology of Tourism: Domestic Tourism	**2**
Session V	International Tourism	**2**
Session VI	Tourism as an industry.	**2**
Session VII	Concepts of Tourist, visitor and excursionist	**2**
Session VIII	Concepts of recent tourism trends.	**2**
Session IX	Growth and development of tourism business in India	**2**
Session X	Impacts of Tourism (Social, Economic, Physical and Environmental)	**2**

Session XI	Field Trip (Eco-Village/Tourism)	**2**
Session XII	Field Trip	**2**
Session XIII	Field Report and Discussion	**2**
Session XIV	Project Submission & Presentation	**2**
Session XV	Evaluation (Viva-Voce)	**2**

Learning Resources:

1. Seth, P. N., Seth, P. N., & Bhat, S. S. (2003). *An Introduction to Travel and Tourism*. Sterling Publishers Pvt. Ltd.
2. Sinha, R. K. (1999). *Travel and Tourism Management*. Dominant Publishers & Distributors.
3. Chawla, R. (2004). *Tourism Management*, Sonali Publishers, Delhi.
4. Sharma, S. P. (2004). *Tourism Education: Principles, Theories and Practices*. Kanishka Publishers.
5. Kamra, K. K., & Chand, M. (2004). *Basics of Tourism: Theory, Operation and Practice*.
6. Negi, J. (1990). *Tourism and Travel: Concepts & Principles*.
7. Jayapalan, N. (2001). *Introduction to Tourism*. Atlantic Publishers & Dist.
8. Nigam, S. C. (2008). *Eco-Tourism and Sustainable Development*, Rajat Publications.

2. Assessment

FA (20 marks)	**Attendance (5 marks)**
Activity-based Assessment.	75%-79%– 2 marks 80%-85%– 3 marks 86%-90%– 4 marks Above 90%– 5 marks
Summative Assessment (SA – 25 marks)	
Project Submission and Viva voce of 25 marks.	

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Ms. Sradha Pradhan Signature:	Name: Dr. Dipankar Rudra Signature:	Name: Mr. Anirban Ghosh Signature:

Course Code: 23BBAVAC101 | Couse Name: Introduction to Tourism
Department: Management Studies

Sl. No.	Department of student	Roll Number	Name
1	Management Studies	USL2023BBA02	ADARSH BINDAL
2	Management Studies	USL2023BBA05	ADITYA RATHI
3	Management Studies	USL2023BBA07	ANIK SAHA
4	Management Studies	USL2023BBA08	ANKITA AGARWAL
5	Management Studies	USL2023BBA09	ANUSKHA DUTTA
6	Management Studies	USL2023BBA10	ARON KANJ BOROGAON
7	Management Studies	USL2023BBA14	ASHRAY CHETTRI
8	Management Studies	USL2023BBA16	AYUSHI AGARWAL
9	Management Studies	USL2023BBA17	BISHAL SHARMA
10	Management Studies	USL2023BBA18	CHIRAG BAID
11	Management Studies	USL2023BBA19	DEBAJIT CHAKRABORTY
12	Management Studies	USL2023BBA21	DHRUB AGARWAL
13	Management Studies	USL2023BBA22	DHRUV AGARWAL
14	Management Studies	USL2023BBA23	DICHEN LAMU BHUTIA
15	Management Studies	USL2023BBA24	DIKSHIKA PAREEK
16	Management Studies	USL2023BBA25	HARISH AGARWAL
17	Management Studies	USL2023BBA26	ISHIKA GUPTA
18	Management Studies	USL2023BBA30	KRITI GUPTA
19	Management Studies	USL2023BBA33	MD TARIQUE ANWAR
20	Management Studies	USL2023BBA35	MRINMAY SAHA
21	Management Studies	USL2023BBA38	NEEKHAT PARVIN
22	Management Studies	USL2023BBA39	NIDHI GHOSH
23	Management Studies	USL2023BBA40	NIKITA SHARMA
24	Management Studies	USL2023BBA44	PIYUSH MOUR
25	Management Studies	USL2023BBA45	PRAKRITI CHHETRI
26	Management Studies	USL2023BBA46	PRATIK MANDAL
27	Management Studies	USL2023BBA48	PRERNA SINGH
28	Management Studies	USL2023BBA49	PRIYANKA KUMARI
29	Management Studies	USL2023BBA50	PRIYANSH MITTAL
30	Management Studies	USL2023BBA52	SAADGI AGARWAL
31	Management Studies	USL2023BBA54	SARBOJIT DAS
32	Management Studies	USL2023BBA55	SAYAN ROY
33	Management Studies	USL2023BBA57	SHUBHAM
34	Management Studies	USL2023BBA58	SIDDHARTHA RAI
35	Management Studies	USL2023BBA59	SMRITI GUPTA
36	Management Studies	USL2023BBA63	TULIP AGARWAL
37	Management Studies	USL2023BBA69	AYUSH SHARMA
38	Management Studies	USL2023BBA71	ARNAB DAS GUPTA
39	Management Studies	USL2023BBA72	SUPRAJIT PRAMANIK

1. Course Description

Course Code	23BBAVAC102
Course Title	TOURISM PRODUCTS
Credits	1
Total Session Hours	30
Number of Sessions	15
Course Type	VAC
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Tourism products.
Course Offered to	BBA
Regulation	2023
Course Overview	This course: a) Familiarize students with different types of tourism products. b) Provides an understanding of cultural tourism resources of India. c) Provides knowledge about the social and cultural set up in India and its contribution to tourism.
Prerequisite	Basic knowledge of tourism products in tourism products.
Course Objectives	A student will be able to: a) Understand the importance and types of Tourism Products. b) Identify the popular religious shrines, classical dance styles, and different school of Indian Music. c) Identify the different potential tourist resources. d) Explain the growth and development of Himalayan Region, Dessert and Coastal areas as tourist resources. e) Identify any one tourism product and submit a report.

Course Content

Session	Session Details	Session Hours
Session I	Introduction: Tourism Products	**2**
Session II	Socio-cultural resources: Important historical and archaeological sites	**2**
Session III	Popular religious shrines: Hindu/Buddhist/Jain/Muslim/Christian and Others	**2**
Session IV	Classical Dances and dance styles of India	**2**
Session V	Music and instruments – Different school of Indian Music	**2**
Session VI	Handicrafts as potential tourist resources	**2**
Session VII	Important Fair and Festivals	**2**

Session VIII	Himalayan region as major tourist resource (Sikkim, Darjeeling & Kalimpong Hills)	**2**
Session IX	Development of Desert Tourism	**2**
Session X	Coastal areas/ beaches and islands.	**2**
Session XI	Presentation on various dance forms/folk musical instruments/folk songs.	**2**
Session XII	Field Visit (Any popular religious shrines/historical/archaeological sites)	**2**
Session XIII	Field Report and Discussion.	**2**
Session XIV	Project Submission on any topic of tourism products.	**2**
Session XV	Evaluation (Viva-Voce)	**2**

Learning Resources:

1. Chawla, R. (2006). *Tourism: The Cultural Heritage*. Arise Publishers.
2. Mukherjee, R. K. (2012). *Cultural Art of India.* Radha Publications.
3. Pradhan, G. K. (1976). *Towards the silver crests of the Himalayas*. Bharatiya Vidya Bhavan.
4. Jhala, L. S. (2017). *Tourism Development in Desert and Humid Zones*, Himanshu Publication.
5. Kumar R. & Ram, S. (2013). *Tourism in North-East India*, Arpan Publications.
6. Robinet, J. P. & Mahadevan, S. J. (2012). *Tourism Products of India*, Abhijeet Publications.
7. Rajaval, N. (1998). *Tourism in Andaman and Nicobar Islands*, Manas Publications

2. Assessment

FA (20 marks)	**Attendance (5 marks)**
Activity-based Assessment.	75%-79%– 2 marks 80%-85%– 3 marks 86%-90%– 4 marks Above 90%– 5 marks
Summative Assessment (SA – 25 marks)	
Project Submission and Viva voce of 25 marks.	

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Ms. Sradha Pradhan Signature:	Name: Dr. Dipankar Rudra Signature:	Name: Mr. Anirban Ghosh Signature:

Course Code: 23BBAVAC102 | Course Name: TOURISM PRODUCTS

Department: Management Studies

SL.No.	Department	Roll No.	Name
1.	Management Studies	USL2023BBA02	Adarsh Bindal
2.	Management Studies	USL2023BBA05	Aditya Rathi
3.	Management Studies	USL2023BBA07	Anik Saha
4.	Management Studies	USL2023BBA08	Ankita Agrawal
5.	Management Studies	USL2023BBA09	Anushka Dutta
6.	Management Studies	USL2023BBA14	Ashray Chettri
7.	Management Studies	USL2023BBA16	Agrawal Ayushi Deepakbhai
8.	Management Studies	USL2023BBA17	Bishal Sharma
9.	Management Studies	USL2023BBA18	Chirag Baid
10.	Management Studies	USL2023BBA19	Debajit Chakraborty
11.	Management Studies	USL2023BBA22	Dhruv Agarwal
12.	Management Studies	USL2023BBA23	Dichen Iamu Bhutia
13.	Management Studies	USL2023BBA24	Dikshika Pareek
14.	Management Studies	USL2023BBA25	Harish Agarwal
15.	Management Studies	USL2023BBA26	Ishika Gupta
16.	Management Studies	USL2023BBA30	Kriti Gupta
17.	Management Studies	USL2023BBA35	Mrinmay Saha
18.	Management Studies	USL2023BBA38	Neekhat Parvin
19.	Management Studies	USL2023BBA39	Nidhi Ghosh
20.	Management Studies	USL2023BBA40	Nikita Sharma
21.	Management Studies	USL2023BBA44	Piyush Mour
22.	Management Studies	USL2023BBA45	Prakriti Chhetri
23.	Management Studies	USL2023BBA46	Pratik Mandal
24.	Management Studies	USL2023BBA48	Prerna Singh
25.	Management Studies	USL2023BBA49	Priyanka Kumari
26.	Management Studies	USL2023BBA50	Priyansh Mittal
27.	Management Studies	USL2023BBA52	Saadgi Agarwal
28.	Management Studies	USL2023BBA54	Sarbojit Das
29.	Management Studies	USL2023BBA57	Shubham
30.	Management Studies	USL2023BBA58	Siddhartha Rai
31.	Management Studies	USL2023BBA59	Smriti Gupta
32.	Management Studies	USL2023BBA63	Tulip Agarwal
33.	Management Studies	USL2023BBA68	Dhrub Agarwal
34.	Management Studies	USL2023BBA69	Ayush Sharma
35.	Management Studies	USL2023BBA71	Arnab Das Gupta
36.	Management Studies	USL2023BBA72	Suprajit Pramanik

1. Course Description

Course Code	23THMVAC101
Course Title	LEADERSHIP & MANAGEMENT SKILLS
Credits	1
Total Session Hours	30
Number of Sessions	15
Course Type	VAC
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Time management, conflict management, stress management, and self-development.
Course Offered to	BBA & BBA in Tourism & Hospitality Management
Regulation	2023
Course Overview	This course: a) Recognizes the need to enhance Time, Conflict, and Stress Management Skills. b) States the importance of developing self-discipline and control. c) Describes the importance of developing business ideas, product pitching and Innovative leadership.
Prerequisite	Basic knowledge of leadership and its qualities.
Course Objectives	A student will be able to: a) Develop essential skills to influence and motivate others. b) Inculcate emotional and social intelligence and integrative thinking for effective leadership. c) Create and maintain an effective and motivated team to work for society. d) Make learners understand personal values and apply ethical principles in professional and social contexts. e) Familiarize the learners with the budgeting process and make them conscious of the significance of budgeting, savings, and investment.

Course Content

Session	Session Details	Session Hours
Session I	**Present a report/video prepared by group of students.** Each group is asked to answer the following questions: a) Did someone emerge as the leader of the group activities? b) Was the group leader effective in motivating the members to work as a team and complete the task? Yes/No and why? c) What kind of leadership style did the leader adopt?	**2**

Session II	**Role Play** Select three volunteers from among the learners. Explain a leadership situation. Ask them to act.	**2**
Session III	The learners are asked to sit in groups of 4-8, depending on class size. Each group must consider that it is responsible for managing the class event and is told to prepare a summary of the following items in 20 minutes. a) Fix a suitable date for the event b) Work out a budget for the event. c) Complete a list of tasks to be performed for organizing the event. d) Combine tasks to form roles. e) Identify the reporting relationship among the different roles. f) Assign roles to different individuals in the group so that the event can be successfully managed. g) Each member to prioritize and schedule the tasks included in each role so that all the deadlines are met.	**2**
Session IV	**Activity of Time Management** **Situation for discussion:** Two individuals are asked to paint the walls of two different rooms of identical dimensions. They are given an equal quantity of paint and told to finish the work by the end of the day. One person finishes the work two hours before the end of the day but the painting is patchy and uneven. The other person does not complete the painting of the entire room, he consumes all the paint as well, but whatever work he has done is even and beautiful. Discuss the efficiency and effectiveness of the two painters. They may be asked to answer the question: Are any of the two painters successful in managing their tasks?	**2**
Session V	**Activity on Conflict Management** The learners must be asked a) Can you recall the last conflict you had with an individual or a group? b) Did you resolve it? How was it resolved? What was the outcome of the Conflict? Draw focus on empathy and communication for resolving interpersonal conflicts	**2**

Session VI	**Activity on Stress Management** Ask the learners to look at each obstacle they encounter as a learning experience. For example. "You may not have done well in your mid-term exam, but that has motivated you to study harder and ace your final exam". a) Make the choice not to over-react to stressors and deal with them one at a time For example, take a few deep breaths and carry on. b) Take an objective view of your stressor For example, is preparing dinner for 12 people really that horrible? c) Communicate! Ask the learners not to ruminate or bottle up their emotions, as this will lead to an explosion later on.	**2**
Session VII	**Develop self-discipline and control** Tell the learners - "Either train yourself to study harder in preparation for your final examination, or train yourself to work out four times a week to lose those extra kilos that you gained since the last dinner party!" Maintenance! Practice, practice, practice for a long life of resilient living! Learners should be encouraged to inculcate the reading habit, which helps in busting stress. Some suggested readings for learners could be: a) Swami Vivekananda. 1958. Powers of the Mind. Kolkata: Advaita Ashrama. b) Abdul Kalam, APJ. 1999. Wings of Fire- An Autobiography. Universities Press.	**2**
Session VIII	**Activity on Self-Management Skills** The learners may be asked to watch this 5.5-minute video on Goleman's explanation of EI https://www.youtube.com/watch?v=Y7m9eNoB3NU Ask the learners to answer the following question: a) Is IQ or EQ more important for success in Life? b) Establish the significance of EI and self-awareness as a component of EI. This 4.5-minute video on "Can EI be Learnt" can be watched by learners.	**2**
Session IX	**Developing Self-Awareness with JOHARI window** Learners may be asked to carry out the JOHARI window exercise in groups of 4. Learners who are willing may be asked to share the findings of the JOHARI window exercise.	**2**

Session X	**Activity on Developing Business Idea** Ask learners to identify the market to test their potential ideas. ¬ Share the "DOs" and "DO NOTs". Do – (example can be) a) The learners must identify a real market and gain insights and honest feedback from potential customers. b) Keep your eyes and ears open and pay close attention to customers' cues, inputs, etc. DO NOT- (example can be) c) Don't consider your parents, or friends as a potential market d) • Don't be adamant to defend your idea or convey an offensive response to criticism.	**2**
Session XI	**Activity on Product Pitching** **Role Play:** Let learners form three groups, each of the group having at least four to five learners. The groups will act as: a) Potential venture capitalists/investors; b) Potential customers; and c) Members of regulatory agencies. Ask each learner to pitch his/her product in front of the three groups. Let each group play a serious role, full of critical inputs. Keep a separate group of observers who provide a careful analysis of each of the pitching event(s). Record the pitching process and ask each of the learners to review his/her pitching. **Final suggestion:** Ask them to keep rehearsing their pitching process. Through multiple rehearsals and analysis each learner should be able to make a razor sharp and pertinent pitch within one minute.	**2**
Session XII	**Activity on Innovative Leadership** Ask learners to write a brief note on their views or any incidents from their past when they realized the importance of any or many of the following: a) Self-Awareness and Control b) Empathy c) Social Expertness d) Personal Influence e) Mastery of Vision Let them interpret these with a free mind without prejudice or external hint or guidance. Once they have written give a brief input to explain the terms.	**2**
Session XIII	**Activity on Designing Skit** **Role Play:** Make multiple groups of learners. Allocate one title each from the following list of ten topics, to each group. a) Words can hurt, pay attention to them	**2**

	b) Share when you have failures c) Be kind d) Listen e) Disagree with respect f) Show empathy g) Share your own feelings h) Encourage the relationship i) Recognize your feeling j) Explain what feelings do k) Be savvy with discipline l) Apologize with dignity m) Model responsibility n) Make yourself available Ask each group to keep their topic secret from other groups. Now ask each group to come up with a small skit highlighting their topic. Other groups will try to decipher the message which must be the moral embedded in the skit. Let the other groups interpret the topic.	
Session XIV	**Activity on Creative Confidence** Ask learners to watch the following video for the methodology of developing human-centric solutions for creating social good (this can be a home assignment). The video entitled India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta – https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention Show them the following Ted talk entitled "How to Build Your Creative Confidence" by David Kelly https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence Based on the video, encourage them to build and take forward their idea. Ask any three learners to volunteer for presenting their idea in the five stages of design thinking. Time can be given for them to prepare. Ask other learners to also frame their ideas using the five-point framework of design thinking	**2**
Session XV	**Self-reflection exercise on ethics and integrity:** Make the learners do self-analysis and reflection. Ask them to follow the following steps: a) Write a short autobiography (say 100 words). b) Write 100 words about their present situation. **c)** Write 100 words about their future. Now ask them to identify what	**2**

	would be the top 5 things/characteristics/personality traits that will help them achieve their future goals and visions.	

Learning Resources:

1. Ashokan, M. S. (2015). *Karmayogi: A Biography of E. Sreedharan*. Penguin Random House, London, UK.
2. Sinek, S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Portfolio London: Penguin.
3. Akhilesh, K. B. (n.d). Lecture no 9 Leadership in the NPTEL Course on Evolution of Management. https://nptel. ac.in/courses/122/108/122108038
4. Carnegie, D. (2018). *Overcoming Worry and Stress*. New Delhi: Manjul Publishing House.
5. Dawkins, E. R. (2016). *52 Weeks of Self Reflection—Your Guided Journal of Self Reflection*. A B Johnson Publishing, United States.

2. Assessment

FA (20 marks)	**Attendance (5 marks)**
Activity-based Assessment.	75%-79%– 2 marks 80%-85%– 3 marks 86%-90%– 4 marks Above 90%– 5 marks
Summative Assessment (SA – 25 marks)	
Project Submission and Viva voce of 25 marks.	

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Ms. Debarati Deb Signature:	Name: Dr. Dipankar Rudra Signature:	Name: Mr. Anirban Ghosh Signature:

Course	**Leadership Skills**	
Code	**23THMVAC101**	
Department	Roll Number	Name
BBA Tourism	USL2023THM16	SOUVIK SINGHA ROY
BBA Tourism	USL2023THM02	ARMAN TAMANG
BBA Tourism	USL2023THM14	SAHIL THAPA
BBA Tourism	USL2023THM03	DEV KARAN SAPRA
BBA Tourism	USL2023THM11	PRANIL RAJ RAI
BBA Tourism	USL2023THM04	GAURAV THAPA
BBA Tourism	USL2023THM05	JIBANESH KARMAKAR
BBA Tourism	USL2023THM18	WILLINA RAI
BBA Tourism	USL2023THM01	ANA RAI
BBA Tourism	USL2023THM07	MELYSSA TAMANG
BBA Tourism	USL2023THM12	PRATIK GAZMER
BBA Tourism	USL2023THM08	NIKESH GURUNG
BBA Tourism	USL2023THM15	SHARMISTHA DHAR
BBA Tourism	USL2023THM10	NISHTHA MUKHERJEE
BBA Tourism	USL2023THM13	SABIAL ORAON
BBA Tourism	USL2023THM06	MARIYANUS ORAON
BBA Tourism	USL2023THM19	BIDHAN BISWAS
BBA Tourism	USL2023THM20	BISHAL VERMA
BBA Tourism	USL2023THM21	RISHI RAI
BBA Tourism	USL2023THM22	MICHELLE DIAS

1. Course Description

Course Code	23THMVAC102
Course Title	CAREER & TEAM SKILLS
Credits	1
Total Session Hours	30
Number of Sessions	15
Course Type	VAC
Semester	II
Intended Level	Certificate
Issue(s) Addressed	Time management, conflict management, stress management, and self-development.
Course Offered to	BBA in Tourism & Hospitality Management
Regulation	2023
Course Overview	This course: a) Acquire career skills and fully pursue to partake in a successful career path. b) Prepare a good résumé and prepare for interviews and group discussions. c) Understand the significance of team skills and design, develop, and adapt to situations as an individual and as a team member.
Prerequisite	Basic knowledge of leadership, career and team skills
Course Objectives	A student will be able to: a) Demonstrate a set of cognitive skills such as critical thinking, problem-solving and the ability to learn for smooth and efficient functioning at a workplace. b) Demonstrate a set of non-cognitive skills such as empathy, creativity, teamwork, and collaboration, for smooth and efficient functioning at a workplace. c) Use common technology messaging tools that are used in an organization for the flow of information and transition from command and control to informal communication during an online or offline team session. d) Actively use and operate online team communication tools such as Webinar, Skype, Zoom, Google, and Hangout. e) Appreciate and demonstrate team skills.

Course Content

Session	Session Details	Session Hours
Session I	**Resume skills- (Briefing on introducing resume and related terms,**	**2**

	importance, difference between VC, resume and bio-data) Provide some exemplary résumés for learners to evaluate, as a small group assignment based on essential components. Hold discussion on résumés with essential components and without essential components. Ask the learners to identify the errors made in the résumé.	
Session II	**Interview skills- (Introduction to the meaning and types of interviews)** Role Play: Make small groups of learners. One learner plays the role of interviewee and three or four others can be the interviewers. The role may be reversed after each interviewee answers one question. Other learners can observe and give their comments.	**2**
Session III	**Group discussion skills- (Brief discussion on meaning, importance and types of group discussion)** Simulation • Eight to ten learners as participants in a GD sitting in a semi-circle or a U-shaped arrangement. • The panelists may observe the group from a distance. • Duration of the GD maybe 45 minutes to an hour. • Roles that a candidate can play in a GD such as initiator, data giver, criticizer, supporter, listener, questioner, traffic policeman, spectator and leader (coordinator).	**2**
Session IV	**Exploring career opportunities- (Short discussion on process of career exploration. Personal characteristics, requirements of jobs and sources of career information)** Project Preparation of Career Case Study in an identified occupation: • Ask the learners to identify professionals in the career of their choice and interview them using an interview schedule or questionnaire. • The learners may analyse the responses in the case study and finalize their career plans. • Learners can also share the case studies with peers to think about a particular career.	**2**
Session V	**Presentation skills (Discussion on meaning, types and strategies of presentation)** An assignment can be given to the learners to select a particular type of presentation and suggest the opening and closing of the presentation. After the submission of the assignment, the faculty member can ask a few learners to describe the opening and closing of the presentation. Other learners can note down the strong and weak	**2**

	points. The same may be shared with the presenters.	
Session VI	**Trust and collaboration (Short discussion on Importance of Trust in Creating a Collaborative Team and different types of trust)** Learners may be asked to prepare a brief write up on each type of trust and present it in the classroom for sharing. It can be small group work.	**2**
Session VII	**Listening as a team skill (Discussion on listening as a team skill and advantages of effective listening skills)** Activity A group discussion can be organized and learners can observe the following advantages of listening skills: • Effective listening implies concentration and the use of other senses as it is more than just hearing the spoken words. • We learn more when we talk less and listen more. • The better we listen, the more will we be listened to. • Listening makes us more knowledgeable and thoughtful. • Without listening, messages are misunderstood and communication breaks down. • Good listeners always come across as wise people. • Good listening and skillful questioning give out a powerful message to those with whom we interact. • Good listening encourages open, honest and full communication. • Always seek clarification while listening, to ensure that your understanding is correct.	**2**
Session VIII	**Brainstorming (Brief discussion on nature, importance and process of brainstorming)** Demonstrate a brainstorming session using the following steps: a) Define the problem clearly and lay out any criteria to be met. b) Keep the session focused on the problem. c) Ensure that no one criticizes or evaluates ideas during the session. Criticism introduces an element of risk for group members when putting forward an idea. This stifles creativity and cripples the free-running nature of a good brainstorming session. d) Encourage an enthusiastic, uncritical attitude among members of the group. Try to get everyone to contribute and develop ideas, including the quietest members of the group. Let the students have fun brainstorming. Encourage them to come up with as many ideas as possible, from solidly practical ones to wildly impractical ones. Welcome creativity. e) Ensure that no train of thought is followed for too long. f) Encourage people to develop other people's ideas, or to use other ideas to create new ones. g) Appoint one person to note down ideas that come out of the session. A good way of doing this is to use a flip chart. This should be studied and evaluated after the session.	**2**

Session IX	**Social and cultural etiquette (Brief discussion on importance of social and cultural etiquette in improving interpersonal relationships and the role of social and cultural etiquette in an organization)** Organize a brainstorming session on social etiquette. Ask learners to prepare a list of social etiquette people practice in social settings. After the brainstorming session, cross-check whether learners have identified all etiquette listed below. If they have left any, describe them. • Always be on time for get-togethers to show respect for other people's time. • Make eye contact during a conversation. Avoid looking over the other person's shoulder unless you see potential danger. • Never interrupt the other person unless it is very essential • Give and receive compliments graciously. • Don't gossip with and about friends. After all, if you share gossip with someone, that person will wonder what you are saying behind his or her back. • Hold doors for anyone who seems to be struggling, including physically challenged people and parents with young children. • Always carry a gift for the host or hostess, if invited formally. • Do not visit friends or others during illness to avoid their exposure to illness. • Cover your mouth and nose when you sneeze. • Pay your share when you are with a friend or group. If you stiff your friends, they may not invite you again. This includes tipping.	**2**
Session X	**Internal Communication (Brief discussion on the need for effective internal communication and different tools for effective internal communication)** The learners may be asked to visit any organization/institution and: a. Find out the tools used for internal communication within the organization/institution. b. Learn the strengths and weaknesses of each tool (may take feedback from employees and employer/ seniors) c. Prepare the write up and present it for discussion in the classroom. This will help to understand the effectiveness of the types of communication tools in making communication more functional and productive within an organization.	**2**
Session XI	**Active listening strategies (Discussion on importance of active listening skills in workplace)** **Role play**: Learners can play the role of a leader and team members and practice listening skills. The faculty member can observe the performance of learners (as a leader and team member) and assess them. **Self-evaluation of listening skills**: Learners may be asked to visit a few following websites given in the references to know about their listening skills. They may develop their own listening profile and address the	**2**

	challenges of listening effectively.	
Session XII	**Peer behaviour and participation (Discussion on importance of group coherence in an organisation)** Organizing a discussion session: • Peer observation reports of the behaviour and participation of each learner during a brainstorming session. • The faculty member may develop some criteria with the help of learners to assess the knowledge and learning of skills. • Self-learning report of each learner about their experience and reflection during a brainstorming session.	**2**
Session XIII	**Peer pressure (Discussion on positive and negative effects of peer pressure)** Organise a simulation model on the impact of positive and negative peer pressure and the strategies to overcome negative peer pressure.	**2**
Session XIV	**Developing interpersonal skills (Discussion on the importance of interpersonal skills in management)** Students may be asked to see the following video and identify areas of improvement, focus on basic communication skills and improve more advanced communication skills. https://www.skillsyouneed.com/interpersonal-skills.html	**2**
Session XV	**Self-control (Discussion on defining self-control and impacts of self-control in organizational behaviour)** The learners can watch the following video to learn about Self Control: Teaching Learners About Their Greatest Inner Strength with Nathan DeWall	**2**

Learning Resources:

1. Kuratko, D. F., & Rao, T. V. (2012). *Entrepreneurship: A South-Asian Perspective*. Cengage Learning.
2. Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2014). *Empreendedorismo-9*. Amgh Editora.
3. Desai, V. (2009). *Dynamics of Entrepreneurial Development and Management* (pp. 119-134). Himalaya Publishing House.
4. Dollinger, M. J. (1985). *Environmental contacts and financial performance of the small firm.* Journal of Small Business Management (pre-1986), 23(000001), 24.
5. Holt, D. H. (1992). *Entrepreneurship.* New Venture Creation.
6. Plsek, Paul E. (n.d). *Creativity, Innovation and Quality. (Eastern Economic Edition), New Delhi:* Prentice-Hall of India. ISBN-81-203-1690-8.
7. Singh, N. P. (n.d). *Emerging Trends in Entrepreneurship Development.* New Delhi: ASEED.
8. Khanka, S. S. (2006). *Entrepreneurial Development*. S. Chand Publishing.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

FA (20 marks)	Attendance (5 marks)
Activity-based Assessment.	75%-79%– 2 marks 80%-85%– 3 marks 86%-90%– 4 marks Above 90%– 5 marks
Summative Assessment (SA – 25 marks)	
Project Submission and Viva voce of 25 marks.	

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Ms. Debarati Deb Signature:	Name: Dr. Dipankar Rudra Signature:	Name: Mr. Anirban Ghosh Signature:

Campus	**SILIGURI**
Course Code	**23THMVAC102**
Course Name	**CAREER AND TEAM SKILLS**
Name of Course Instructor(s)	

Department	Roll No.	Name
BBATHM	USL2023THM01	ANA RAI
BBATHM	USL2023THM02	ARMAN TAMANG
BBATHM	USL2023THM03	DEV KARAN SAPRA
BBATHM	USL2023THM04	GAURAV THAPA
BBATHM	USL2023THM07	MELLYSA TAMANG
BBATHM	USL2023THM08	NIKESH GURUNG
BBATHM	USL2023THM10	NISHTHA MUKHERJEE
BBATHM	USL2023THM11	PRANIL RAJ RAI
BBATHM	USL2023THM12	PRATIK GAZMER
BBATHM	USL2023THM13	SABIAL ORAON
BBATHM	USL2023THM14	SAHIL THAPA
BBATHM	USL2023THM15	SHARMISTHA DHAR
BBATHM	USL2023THM16	SOUVIK SINGHA ROY
BBATHM	USL2023THM18	WILLINA RAI
BBATHM	USL2023THM20	BISHAL VERMA
BBATHM	USL2023THM21	RISHI RAI

Course Description:

Course Code: 23EDUVAC101
Course Title: Teaching Learning Materials
Course Type: Value Added Course
Credit: 1
Total Hours: 30
Hours per Week: 2
Course Type: Value Added Course

Objectives

Teaching Learning Materials offer a range of resources and lesson materials that teachers can use to teach. The objective of TLMs is to make lessons interesting, learning easy and enable teachers to easily express concepts. They help in significantly increasing the learner's achievements by supporting learning.

This course aims to provide a conceptual understanding of Teaching Aids, to make the students aware of the characteristics of Teaching Aids, to recognise the effectiveness of using teaching aids in teaching-learning. It further aids in the construction of improvised teaching aids. This course has been designed to fulfil the criteria set by NEP 2020 for Value Added Course (VAC).

Detailed Module

Session 1: Understanding TLMs
(2 Hours)
To introduce students to the concept of Teaching Learning Materials (TLMs) and help them understand the various principles and their significance in education.

Session 2: Types of TLMs
(2 Hours)
To enable students to differentiate among various types of TLMs - Audio TLMs, Visual TLMs, Audio Visual TLMs.

Session 3: Selection & Evaluation of TLMs
(2 Hours)
To enable students to learn how to select and evaluate appropriate TLMs based on learning objective, grade level and student's needs.

Session 4: Integration into Curriculum
(2 Hours)
To demonstrate how TLMs can be effectively integrated into the curriculum to enhance teaching and learning outcomes.

Session 5: Creation of TLMs
(2 Hours)
Phase 1 - Subject specific TLMs **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 6: Creation of TLMs
(2 Hours)
Phase 2 - Subject specific TLMs **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 7: Creation of TLMs
(2 Hours)
Phase 3 - Subject specific TLMs **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 8: Creation of TLMs
(2 Hours)
Phase 4 - Subject specific TLMs **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 9: Creation of TLMs
(2 Hours)
Phase 5 - Subject specific TLMs **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 10: Creation of TLMs
(2 Hours)
Phase 6 - Educational Level - Pre-Primary TLMs **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 11: Creation of TLMs
(2 Hours)
Phase 7 -Educational Level - Primary **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 12: Creation of TLMs
(2 Hours)
Phase 8 - Educational Level - Secondary **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 13: Creation of TLMs
(2 Hours)
Phase 9 - Educational Level - Higher Secondary **(**Audio TLMs, Visual TLMs, Audio Visual TLMs)

Session 14: Creation of TLMs
(2 Hours)
Presentation of TLMs by the students.

Session 15: Creation of TLMs
(2 Hours)
Presentation of TLMs by the students.

This will form the basis for the evaluation.

Mode of Evaluation: Practical (Using Log Book)

Suggested Readings-

1. Lal, H. (2011). Manual of Low Cost Technological Aids. Sai Publications, Faridabad.

2. Kumar, K.L. (1996). Educational Technology. New Age International, New Delhi.

Course Code: 23EDUVAC102
Course Title: COMMUNITY DEVELOPMENT
Course Type: Value Added Course
Credit: 1
Total Hours: 30
Hours per Week: 2
Semester: II
Intended Level: Certificate
Issue(s) Addressed: Human Values
Course Offered to: Education
Regulation: 2023

Objectives

Community Development is a holistic approach grounded in the principles of empowerment, human rights, inclusion, social justice, self-determination and collective actions. The objective of community development is to empower community members and create stronger and more connected communities.

This course intends to provide a conceptual understanding about Community Development, it will allow the students to explore about community needs, how local context impacts program development, best practice when engaging with and implementing community programs and ethical considerations into community interventions. This course has been designed to fulfil the criteria set by NEP 2020 for Value Added Course (VAC).

Detailed Module

Session 1: Understanding Community Development
(2 Hours)

To introduce students to the concept of Community Development and help them understand the various principles, need and importance of Community Development in education.

Session 2: Community Group Dynamics
(2 Hours)

To enable students to reflect on the various roles and relationships in community group – The guide role, the enabler role, the expert role, communicator, counsellor, educator.

Session 3: Identification & Selection of Community Development Programme
(2 Hours)

To enable students to learn how to identify and select an appropriate community group based on the principles, needs, roles and relationships of community development.

Session 4: Planning of Community Development Programme
(2 Hours)

To enable students to learn to plan and strategize community development program by engaging community members using learning by doing method, adventure learning, cooperative learning and active learning to ensure a long-term community engagement in the programme.

Session 5: Preparation of Community Development Activities (2 Hours)

Phase 1 (Level 1) – Preparation of activities by the students through different approaches that can be used in community development (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 6: Preparation of Community Development Activities (2 Hours)

Phase 2 (Level 1) - Preparation of activities by the students through different approaches that can be used in community development (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 7: Preparation of Community Development Activities (2 Hours)

Phase 3 (Level 1) - Preparation of activities by the students through different approaches that can be used in community development (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 8: Execution of Community Development Activities (2 Hours)

Phase 4 (Level 1) – Conducting various community development activities in the selected community by the students (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 9: Execution of Community Development Activities (2 Hours)

Phase 5 (Level 1) – Conducting various community development activities in the selected community by the students (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 10: Preparation of Community Development Activities (2 Hours)

Phase 6 (Level 2) - Preparation of activities by the students through different approaches that can be used in community development (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 11: Preparation of Community Development Activities (2 Hours)

Phase 7 (Level 2) - Preparation of activities by the students through different approaches that can be used in community development (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 12: Preparation of Community Development Activities (2 Hours)

Phase 8 (Level 2)- Preparation of activities by the students through different approaches that can be used in community development (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 13: Execution of Community Development Activities (2 Hours)
Phase 9 (Level 2)– Conducting various community development activities in the selected community by the students (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 14: Execution of Community Development Activities (2 Hours)
Phase 10 (Level 2)– Conducting various community development activities in the selected community by the students (Role-Play, Story-Telling, Demonstrations using real objects, donation camps, skits, games).

Session 15: Evaluation of Community Development Activities (2 Hours)
Sharing of various community development activities conducted through presentations by the students.

This will form the basis for the evaluation.

Mode of Evaluation: Practical (Using Log Book)

Suggested Readings-

1. Ledwith, M. – Community Development in Action
2. Ledwith, M. – Community Development a Critical Approach
3. Perry, C.A. – First Steps in Community Development
4. Perry, C.A. – Community Center Activities

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Priscella Ghimiray Signature:	Name: Vivechana Dewan Signature:	Name: Ranita Chakrabortty Signature:

Course Code	**23MCJVAC100**
Course Title	**Desktop Publishing**
Credits	**1**
Lecture Hours	**30**
Sessions	**15**
Hours/Week	**2**
Category	**Value Added Course (VAC-1)**
Semester	**I**
Regulation	**2023**

Course Overview:

This course –

- Introduces students to the fundamental concepts in Desktop Publishing,
- Explains the basic of software used in desktop publishing like Microsoft Word.
- Explores basics of report writing and publishing.

Prerequisites and/or Note(s):

- Basic understanding of technological progress made in the field of Media and Communication

Course Objectives:

The course is designed to help learners to:

- Understand the concept and industry of desktop publishing.
- Develop essential skills and knowledge on how to use the essential software.
- Create an design professional print productions.
- Nurture a creative mind-set essential to design.
- Familiarize the learners about the latest computing technologies required in the field.

Course Outcomes:

The course is designed to help learners to:

1. Critically examine various newspaper and magazine formats, print production materials.
2. Learn and demonstrate and create using different industry standard software.
3. Understand basics of desktop publishing and develop their own designing aesthetic.
4. Apply different theories and elements to while designing.
5. Create meaningful industry standard print publications and showcasing them online.

COURSE CONTENT

SESSION	CONTENT	HOURS
1	**Introductory session about the course and the tools to be used** Students will be asked about any experiences in design during their school tenure like use of Microsoft Word and Corel Draw.	2
2	**Introduction to basics of windows and MS Word** How to access MS Word.	2
3	**Work Space Essentials of MS Word - 1** Basics of MS Word interface.	2
4	**Work Space Essentials of MS Word - 2** Introduction to different panels in MS Word.	2
5	**Page Set-up in MS Word** Setting up page in MS Word.	2
6	**Typing in MS Word** Fundamentals of typing in MS Word.	2
7	**Saving a Document in MS Word** Essentials of Saving a Document	2
8	**Working with Photos and Graphics in MS Word** Using photos and graphics to enhance a Document Quality.	2
9	**Working with Tables in MS word** Table creation and drawing in MS Word.	2
10	**Creation of a Report Using MS Word** Students will be asked to make a report using MS Word	2
11	**Creation of a CV Using MS Word** Students will be asked to make a CV using MS Word	2
12	**Creation of an Invoice Slip Using MS Word** Students will be asked to make an Invoice Slip using MS Word	2
13	**Creation of a Poster Using MS Word** Students will be asked to make a poster using MS Word.	2

14	**Creation of a formal and informal letter Using MS Word** Students will be asked to make a formal and informal letter using MS Word	**2**
15	**Newsletter production** Learn to create a newsletter. Students will be asked to design a newsletter	**2**

Assessment:

*Formative Assessment***:** 10 internal +5 attendances**.**

*Summative Assessment***:** Assignment submission 30 marks**.**

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:

(Seal) (Seal)

Course Code	**23MCJVAC 101**
Course Title	**Desktop Publishing (Adobe Indesign)**
Credits	**1**
Lecture Hours	**30**
Sessions	**15**
Hours/Week	**2**
Category	**Value Added Course (vac-II)**
Semester	**II**
Regulation	**2024**

Course Overview:

This course –

- Introduces students to the fundamental concepts of Desktop Publishing
- Explains the basics of software used in desktop publishing, Especially Adobe Indesign 2021+
- Explores different elements of graphics and Layout designing

Prerequisites and/or Note(s):

Basic understanding of using a Windows PC and Word processing softwares

Course Objectives:

The course is designed to help learners to-

- Understand the concept and industry of desktop publishing
- Develop essential skills and knowledge about using the desktop publishing software
- Create professional print productions
- Nurture a creative mindset essential to design
- Familiarize the learners about the latest computing technologies required in the field

Course Outcomes:

The course is designed to help learners to:

1. Critically examine various newspaper and magazine formats, print production materials
2. Learn, demonstrate and create using different industry standard software
3. Understand the basics of desktop publishing and develop their own designing aesthetic
4. Apply different theories and elements while designing
5. Create meaningful industry standard print publications and showcasing them online in a portfolio

Course Content

Session	Content	Hours
1	**Introductory session about the course, Syllabus and Adobe Indesign** Students will be asked about any experiences in graphics design and layout during their school tenure and will shown the basics of Software	**2**
2	**Introduction to the Adobe Indesign Interface I** Essentials of Adobe Indesign Workspace Toolbar, Control Bar, Layer bar, Color bar	**2**
3	**Introduction to the Adobe Indesign Interface II** Customizing the workspace according to the need, display options, effects, locking the selections, Color	**2**
4	**Essentials of Adobe Indesign Toolbar I** Working with Adobe Indesign Tools, Drawing and Typing with Adobe Indesign	**2**

5	**Essentials of Adobe Indesign Toolbar II** Placing images and managing images with Adobe Indesign	**2**
6	**Essentials of Adobe Indesign Toolbar III** Alignment, Paragraph, Page Information, Page Set Up	**2**
7	**Essentials of PNG Placement and Wrap** Placing PNG images in Adobe Indesign, Working with Royalty free websites	**2**
8	**Essentials of Typography** Working with different typefaces and Typography composition	**2**
9	**Essentials of Typography II** Downloading external typefaces and working with them	**2**
10	**Essentials of Poster Design** Principles of Poster designing	**2**
11	**Essentials of Poster Design II** Designing a poster using Adobe Indesign	**2**
12	**Essentials of Newspaper Designing** Principles of newspaper designing	**2**
13	**Essentials of Newspaper Designing II** Elements of a newspaper	**2**
14	**Essentials of Newspaper Designing III** Designing a College newspaper using adobe Indesign	**2**
15	**Creation of Final Copy of the Newspaper**	**2**

Assessment:

Formative Assessment: 10 internal +5 attendances.

Summative Assessment: Assignment submission 30 marks.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:

(Seal) (Seal)

Course Code	**23SOWVAC102**
Course Title	**ETHICS AND VALUES IN SOCIAL WORK**
Credits	**1**
Lecture hours Hours/Week	**30** **2 hours per week**
Category	**VAC**
Semester	**II**
Regulation	**2023**

This course explores the ethical principles and values foundational to the social work profession. Through a combination of theoretical frameworks, case studies, and practical applications, students will engage with the National Association of Social Workers (NASW) Code of Ethics, examining how it informs practice and decision-making in diverse contexts.

Session 1: Introduction to Ethics in Social Work

- Overview of course objectives and expectations
- Introduction to the importance of ethics in social work
- Discussion of the NASW Code of Ethics

Session 2: Ethical Theories and Frameworks

- Overview of key ethical theories: utilitarianism, deontology, virtue ethics
- Application of ethical theories to social work practice
- Group activity: Identify ethical dilemmas using these frameworks

Session 3: Core Values of Social Work

- Exploration of core values: service, social justice, dignity and worth of the person
- Reflection on personal values and their influence on practice
- Assignment: Write a reflective essay on personal values in relation to social work

Session 4: Confidentiality and Privacy

- Ethical importance of confidentiality in social work

- Legal implications and limitations
- Case study analysis: Confidentiality breaches

Session 5: Dual Relationships and Boundaries

- Understanding dual relationships in social work
- Ethical implications of boundary violations
- Role-play: Navigating dual relationships

Session 6: Cultural Competence and Ethical Practice

- The role of cultural competence in ethical social work
- Discussion on biases and stereotypes
- Group discussion: Strategies for enhancing cultural competence

Session 7: Informed Consent and Client Autonomy

- Importance of informed consent in practice
- Balancing client autonomy with ethical responsibilities
- Case study: Informed consent scenarios

Session 8: Ethics in Policy and Advocacy

- Examining the social worker's role in advocacy
- Ethical considerations in policy-making
- Group project: Identify an ethical issue in current social policy

Session 9: Social Justice and Social Work

- Understanding social justice as a core value
- Strategies for promoting social justice in practice
- Discussion: Case studies of social justice interventions

Session 10: Ethical Decision-Making Models

- Overview of ethical decision-making models

- Application of a decision-making model to case scenarios
- Assignment: Analyze a case study using an ethical decision-making model

Session 11: Ethics and Technology in Social Work

- The impact of technology on social work practice
- Ethical challenges related to technology use
- Group discussion: Technology case scenarios

Session 12: Professional Integrity and Accountability

- Understanding professional integrity in social work
- The role of supervision and peer feedback in maintaining ethics
- Reflection: Creating a personal code of ethics

Session 13: Responding to Ethical Violations

- Identifying and reporting unethical behavior
- Institutional responses to ethical violations
- Case study analysis: Ethical violation scenarios

Session 14: Preparing for the Final Project

- Guidelines for the final project: Ethical issue in social work
- Workshop: Brainstorming and outlining project topics
- Peer feedback on project ideas

Session 15: Final Presentations and Course Reflection

- Presentation of final projects
- Group discussion and reflection on course learning
- Evaluation of course and feedback

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Rini Bhadra Signature:	Name: Dr. Brian Gomes Signature:	Name: Ranita Chakraborty Signature:

Salesian College

(Autonomous)
Sonada - Siliguri

National Education Policy (NEP) 2020 Curriculum Framework
For
Bachelor of Science/Arts in Economics

Department of Economics

Curriculum Document
2023 – 2024

Vision

The Department envisions to develop an academic environment that is conducive to promote high quality education and research, and to offer educational opportunities to the students so as to develop them into accomplished professionals with an economic bent of mind, who can be successful across different avenues.

Mission

The mission of the department to achieve high academies excellence, create an environment for holistic development of the students, instil critical thinking, foster a better understanding of global, national, and local socioeconomic conditions and problems, and establish a research-oriented ecosystem for the students.

1. Programme Overview

Bachelor of Science/Arts in Economics is a four-year degree programme with the possibility of completing the fourth year with research if a particular student secures 75% CGPA in the previous exams.

2. Programme Objectives and Outcomes (POs)

After completion of the programme, a student will be able to:	
Knowledge	PO01: Develop a foundational understanding of economic principles to analyse economic systems and principles.
	PO02: Build quantitative skills necessary for economic analysis, such as mathematics, statistics and econometrics, to effectively interpret economic data.
	PO03: Foster critical thinking skills to evaluate economic issues, policies and arguments, and to make informed decisions based on economic arguments.
	PO05: Gain a historical context for economic theories and policies, allowing students to understand the evolution of economic thought and institutions.
	PO05: Explore ethical dimensions of economic decisions and policies, including issues related to social justice, environmental sustainability and economic equality.
Skills	PO06: Develop effective written and oral communication skills to convey economic ideas, theories, and research findings clearly and persuasively.
	PO07: Gain proficiency in using economic software, data analysis tools, and technology, relevant to economic research and analysis.
	PO07: Demonstrate financial literacy and understanding of personal finance, including budgeting, investing, and retirement planning.
	PO08: Apply economic principles to real world scenarios, including case – studies, projects and research assignments.
Competence	PO09:Develop problem solving skills that are applicable across various fields and industries, emphasizing the ability to address practical economic challenges.
	PO10:Initiate a life as an independent economic thinker, staying updated on the latest economic theories, policies and trends.
	PO11: Develop critical thinking and problem solving skills, to identify economic problems and to conduct independent research.

3. Programme Specific Objectives & Outcomes (PSOs)

By the end of the Course, the students will be able to:	
Knowledge	PSO1: Develop understanding of the microeconomic and macroeconomic theories.
	PSO2: Build quantitative skills to understand economic theories, using mathematics, statistics and economics.
	PSO3: Gain the historical and contemporary knowledge about Indian Economy, issues and progress.
	PSO3: A Develop a deep knowledge about development theories.
	PSO4: Gain comprehensive understanding of public finance principles and government budgeting.
	PSO5: Master International Trade theories, exchange rates and global economic institutions.
	PSO6: understand the economic dimensions of gender inequality, including the gender wage gap, labour force participation, and gender based discrimination.
	PSO7: Acquire deep understanding of the healthcare systems, including their organisation, financing and delivery systems.
Skills	PSO1: Analyse and model microeconomic scenarios, evaluate market outcomes and apply microeconomic principles to real world situations.
	PSO2: Analyse macroeconomic trends and indicators, assess the impact of govt policies on the economy and predict economic fluctuations.
	PSO3: Formulate and solve mathematical economic models and apply mathematical optimisation techniques.
	PSO4: Design and conduct economic surveys, analyse economic data using statistical software.
	PSO5: Analyse Indian Economic data and trends and formulate policies for Indian Context.
	PSO6:Assess the impact of development policies and analyse development indicators.
	PSO7: Assess the impact of exchange rate fluctuations.
	PSO8: Evaluate Govt budgets and fiscal policies and analyse the economic impact of public programs.
	PSO9: Evaluate healthcare cost effectiveness and analyse healthcare market dynamics.
	PSO10: Able to analyse gender based economic disparities and assess environmental policy impacts.
Competence	PSO1: Formulate and assess economic policies and micro level.
	PSO2: Have critical evaluation of macroeconomic policies and prescription.
	PSO3: Conduct economic analysis using advanced mathematical methods.
	PSO4: Present and interpret statistical findings in economics.
	PSO5: Have critical evaluation on international trade policies.
	PSO6: Design efficient public policies and fiscal strategies.
	PSO7: Contribute to healthcare policy and management decisions.
	PSO8: Promote gender sensitive and environmentally sustainable economic policies.
	PSO9: Conduct independent research.

4. PROGRAMME MATRIX

- **COURSE CODE & COURSE TITLE:**

4.1. Major Courses

	Course Code	Course Titles
1	**23ECNMAJ101**	**Introductory Microeconomics**
2	**23ECNMAJ102**	**Mathematical Economics - I**
3	**23ECNMAJ103**	**Introductory Macroeconomics**
4	**23ECNMAJ104**	**Mathematical Economics - II**
5	**23ECNMAJ201**	**Intermediate Microeconomics - I**
6	**23ECNMAJ202**	**Intermediate Macroeconomics - I**
7	**23ECNMAJ203**	**Intermediate Microeconomics - II**
8	**23ECNMAJ204**	**Intermediate Macroeconomics - II**
9	**23ECNMAJ205**	**Mathematical Economics - III**
10	**23ECNMAJ301**	**Indian Economy - I**
11	**23ECNMAJ302**	**Development Economics**
12	**23ECNMAJ303**	**Statistics - I**
13	**23ECNMAJ304**	**Indian Economy - II**
14	**23ECNMAJ305**	**International Economics**
15	**23ECNMAJ306**	**Statistics and Econometrics**
16	**23ECNMAJ307**	**Sample Survey**
WITH RESEARCH		
17	**23ECNMAJ401**	**Economic Thought**
18	**23ECNMAJ402**	**Environmental Economics**
19	**23ECNMAJ403**	**Tourism Economics**
20	**23ECNMAJ404**	**Agricultural Economics**
21	**23ECNMAJ405**	**Gender Economics**
WITHOUT RESEARCH		
17	**23ECNMAJ401**	**Economic Thought**
18	**23ECNMAJ402**	**Environmental Economics**

19	**23ECNMAJ403**	**Tourism Economics**
20	**23ECNMAJ404**	**Agricultural Economics**
21	**23ECNMAJ405**	**Economics of Health and Education**
22	**23ECNMAJ406**	**Public Economics**
23	**23ECNMAJ407**	**Economic History of India**
24	**23ECNMAJ408**	**Tribal Economics**

4.2. Minor Course

	Course Code	Course Title
1	**23ECNMIN101**	**Microeconomics**

4.3. Multi-Disciplinary Course (MDC)

	Course Code	Course Title
1	**23ECNMDC101**	**Microfinance**
2	**23ECNMDC102**	**Public Economics and Policy Analysis**

4.4. Skill Enhancement Course (SEC)

	Course Code	Course Title
1	**23ECNSEC101**	**Basic Computer Applications**
2	**23ECNSEC102**	**Travel and Tourism**

4.5. Value Added Course (VAC)

	Course Code	Course Title
1	**23ECNVAC101**	**Economic Debate and Discussion**

5. Programme Matrix

Semester	Course Code	Course Type	Title of the Course (40 characters including space)	Credit	Lecture Tutorial Practical (L+T+P)	Total Hours	Total Marks
I	23ECNMAJ101	Major	Introductory Microeconomics	4	4+0+0	60	100
	23ECNMAJ102	Major	Mathematical Economics - I	4	4+0+0	60	100
	23ECNMIN101	Minor	Microeconomics	4	4+0+0	60	100
	23ECNMDC101	MDC	Microfinance	3	3+0+0	45	100
	23AECE101	AEC	Compulsory English	2	2+0+0		50
	23ECNSEC101	SEC	Basic Computer Applications	3	2+0+2	45	100
	23SCSVAC1	VAC	Value Education	1	1+0+0	15	25
	23ECNVAC101	VAC	Economic Debate and Discussion	1	0+0+2	30	25
	Total						
II	23ECNMAJ103	Major	Introductory Macroeconomics	4	4+0+0	60	100
	23ECNMAJ104	Major	Mathematical Economics – II	4	4+0+0	60	100
	23ECNMDC102	MDC	Public Economics and Policy Analysis	3	3+0+0	45	100
	23ECNAEC102	AEC	ALT Eng	2	2+0+0		50
	23ECNSEC102	SEC	Travel and Tourism	3	2+0+2	45	100
	23SCSVAC2	VAC	Environmental Education	1			25
	23ECNVAC102	VAC		1			25
	Total						

6. Course Content

6.1 Course Description

Course Code	23ECNMAJ101
Course Title	Introductory Microeconomics
Credits	4
Total Hours	60
Hours per Week	4
Course Type	Major
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	**This course:** a) Introduces economics. b) Discusses the concepts of Demand and supply. c) Covers the theory of Consumers Behaviour. d) Covers the theory of producers Behaviour.
Prerequisite	Students should possess proficiency in the English language and effective communication skills.
Course Objectives	**The objectives of the course are to:** a. Introduce economics as a subject to the students. b. Provide the students with the concepts of Demand and Supply. c. Provide the students with the understanding of Market Elasticity. d. Provide the students with the understanding of the theories of consumers behaviour. e. Provide the students with the understanding of the theory of producers' behaviour.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Define Economics.	R, U
CO2	Discuss the concepts of Demand and Supply and discuss the factors affecting demand and supply.	R, U, A1
CO3	Explain and calculate the elasticities of demand and supply.	R, U, A1, A2
CO4	Analyse consumers behavior using cardinal and ordinal theories.	R, U, A1, A2
CO5	Analyse producers' behavior.	R, U, A1, A2

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Exploring the Subject Matter of Economics**: a. Scope and method of economics b. The economic problem: scarcity and choice c. Opportunity cost and decision making d. Decision takers: Households, firms and Central authorities	**5**	**CO1**	**R U**
Unit II	**Demand and Supply:** a. Determinants of individual demand and supply b. Law of demand and Law of supply c. Demand and supply schedule demand and supply curve d. Market versus individual demand and supply e. Shifts in the demand and supply curve. f. Market equilibrium and stability of equilibrium.	**15**	**CO2**	**R U A1 A2**
Unit III	**Elasticity of demand & supply:** a. The concept of elasticity of demand b. Point and arc elasticity, cross price elasticity and income elasticity of demand c. Elasticity of supply	**5**	**CO3**	**R U A1 A2 E**
Unit IV	**Consumer and Households Behaviour:** a. Cardinal utility theory: Law of diminishing Marginal Utility, derivation of Marshallian demand curve. b. Ordinal utility theory: Indifference curves and their properties, budget line, consumers' equilibrium. c. Income Consumption Curve, price consumption curve and Engel's curve. d. Demand elasticity and classification of commodities, Normal, Inferior and Giffen goods, Income and Substitution effect e. Revealed Preference Theory.	**20**	**CO4**	**R U A1 A2 E**
Unit V	**Producer/Firm Behaviour:** a. The concepts of Total Revenue, Marginal Revenue and Average Revenue b. Production function c. Law of variable proportion d. Fixed co-efficient production function e. Returns to a factor, returns to scale, iso-quant and its properties, iso-cost line. f. Marginal rate of technical substitution g. Equilibrium of the producer	**15**	**CO5**	**R U A1 A2 E**

	h. Constrained output maximization and constrained cost minimization i. Expansion path j. Elasticity of substitution k. Cobb-Douglas and CES production function.			

Learning Resources:

- Ahuja, H.L. (2010). Modern Economics. S. Chand and Co. Ltd.
- Gravelle, & Rees. Microeconomics. Pearson.
- Henderson, & Quandt. Microeconomic Theory. McGraw Hill.
- Stiglitz, J.E., & Walsh, C.E. Economics. W.W. Norton.
- Case, K.E., & Fair, R.C. Principles of Economics. Pearson Education Inc.
- Koutsoyiannis. Microeconomic Theory. Macmillan.
- Lipsey, & Chrystal. An Introduction to Positive Economics. OUP.
- Madalla, & Miller. Microeconomics-Theory and Applications. McGraw Hill.
- Mankiw, N.G. Economics: Principles and Applications. India edition by South Western.
- Pindyck, Rubinfeld, & Mehta. Microeconomics. Pearson Education Asia. (CTB)
- Salvatore, D. Microeconomics. OUP.
- Varian, H.R. Intermediate Microeconomics: A Modern Approach. (CTB)
- Gould, & Lazear. Micro Economics.

R: Remembering, U: Understanding, A1: Applying,A2: Analysing, E: Evaluating, C: Creating

6.1.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
c. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Bickey Sharma Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:

(Seal) (Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

(College round seal in all pages)

6.2 Course Description

Course Code	23ECNMAJ102
Course Title	Mathematical Economics - I
Credits	4
Total Hours	60
Hours per Week	4
Course Type	Core
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	**This course:** a. Covers the concepts of Sets, Matrix and Determinants. b. Explores Basic calculus and its application in Economics. c. Covers Maxima and Minima and its application in Economics.
Prerequisite	Students need to have had studied either mathematics or business mathematics and business economics in class 12.
Course Objectives (total 5)	**The objectives of the course are:** a. Enable students to understand the concepts of Sets and solve mathematical problems related to them. b. Enable students to understand the concepts of matrices and determinants and solve mathematical problems related to them. c. To provide the knowledge of basic calculus to the students, including differential Calculus, integral calculus and maxima and minima. d. Enable students to apply the concepts of differential calculus, integral calculus and to solve problems in economics. e. Enable students to apply the concepts of maxima and minima and to solve problems in economics.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Define sets and solve mathematical problems related to them.	**R**
CO2	Explain the concepts of matrices and determinants and solve mathematical problems related to them.	**U &AI**
CO3	Demonstrate the knowledge of basic calculus to the students, including differential Calculus, integral calculus and maxima and minima.	**A2**

CO4	Apply the concepts of differential calculus, integral calculus and to solve problems in economics.	**E**
CO5	Apply the concepts of maxima and minima and to solve problems in economics.	**R**

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Theory of Sets:** a. Sets, Set Notations, Set Operations. b. Convex Sets and their Properties. c. Relations, Functions and their Properties. d. The Number System.	**15**	**CO1**	**R U A1 A2 E**
Unit II	**Matrices and Determinants:** a. Vectors and Matrices, Matrix operations, Determinants. b. Inverse Matrix, Solution of a system of linear equation. c. Bordered Hessian Determinant and Cramer's rule. d. Applications in Economics: Comparative Static Analysis and Derivation of Slutsky Equation.	**15**	**CO2**	**R U A1 A2 E**
Unit III	**Differential Calculusand Applications in Economics:** a. Derivative of a Function, Rules of Differentiation, Partial and Total Differentiation, Euler's Theorem. b. Applications in Economics: Demand Function, Elasticity of Demand, Marginal Revenue, Marginal Utility, Marginal Cost, Slope and Curvature of Indifference Curve, Point of Inflexion, Returns to Scale. c. Homogeneous Functions and their Properties, Cobb-Douglas Production Function and their Properties.	**10**	**CO3**	**R U A1 A2 E**
Unit IV	**Integral Calculus and Applications in Economics:** a. Concept of Integration, Rules of Integration, Definite and Indefinite Integral. b. *Applications in Economics*: Finding out Total Revenue Functions, Total Cost Function, Consumption Function	**10**	**CO4**	**R U A1 A2 E**

	and Saving Function when Marginal Functions are given. c. Consumer's Surplus and Producer's Surplus.			
Unit V	**Maxima and Minima and Applications in Economics:** a. Extreme Values of Bi-variate Functions, Sufficient Condition for Extreme Values, First and Second Order Conditions for Optimization without Constraints. b. Constraints Optimization Problems in Economics: Lagrange Multiplier Method, Utility Maximization subject to Budget Constraint, Output Maximization subject to Cost Constraint, Cost Minimization subject to an Output Constraint. c. Relation between AP and MP, Relation between AC and MC, Expansion Path. d. Derivation of Ordinary and Compensated demand curves.	**10**	**CO5**	**R U A1 A2 E**

Learning Resources:

- Allen, R. G. D. Mathematical Analysis for Economics. Macmillan.
- Archibald, & Lipsey. An Introduction to the Mathematical Treatment of Economics. AITBS.
- Bailey, D. Mathematics in Economics. McGraw Hill.
- Baumol, W. J. Operations Research – An Introduction. Prentice Hall.
- Chiang, A. C., & Wainwright, K. Fundamental Methods of Mathematical Economics. McGraw Hill. (CTB)
- Dorfman, R. P., Samuelson, P. A., & Solow, R. M. Linear Programming and Economics Analysis. McGraw Hill.
- Geoff, Renshaw. Maths for Economics. OUP.
- Henderson, J. M., & Quandt, R. D. Micro Economic Theory – A Mathematical Approach. McGraw Hill. (CTB)
- Hoy, M., Livernois, J., McKenna, C., Rees, R., &Stengos, T. Mathematics for Economics. Prentice Hall.
- Mukherjee, B., & Pandit, V. Mathematical Methods for Economic Analysis. Allied.
- Silberberg, E. The Structure of Economics – A Mathematical Analysis. McGraw Hill. (CTB).
- Taha, H. A. Operations Research – An Introduction. Prentice Hall.
- Yamane, T. Mathematics for Economists – An Elementary Survey. Prentice Hall.
- Sydsæter, K., & Hammond, P. Mathematics for Economic Analysis. Pearson E. Asia, New Delhi. (CTB)

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

6.2.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Phu Tshering Sherpa Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:

(Seal) (Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

(College round seal in all pages)

6.3 Course Description

Course Code	23ECNSEC101
Course Title	Basic Computer Applications
Credits	3
Total Hours	60
Hours per Week	4
Course Type	Skill Enhancement Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	**This course:** a. Covers introduction to computers. b. Discusses the storage devices. c. Introduces word processing. d. Discusses worksheets. e. Covers Presentation graphics. f. Covers application of computer applications in economics.
Prerequisite	Students should possess proficiency in the English language and effective communication skills.
Course Objectives	**The objectives of the course are to**: a. Introduce the concept of computers to the students. b. Enable students to understand storage devices. c. Provide the basics of word processing to the students. d. Provide the basics of spreadsheets to the students. e. Provide the knowledge of graphic presentation to the students. f. Enable students to apply computer applications in economics.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of the course, the student will be able to:

COs	Statements	Cognitive Level Mapping
C01	Discuss the history, concepts and characteristics of computing systems	R,U
C02	Discuss storage devices	R,U
C03	Explain the techniques of operating on a MS Word worksheet	R,U,A1,A2,E
C04	Outline the steps in operating on MS Excel Work	R,U,A1,A2,E
C05	Create powerpoint presentations	R,U,A1,A2,C
C06	Apply computer applications in economics	R,U,A1,A2,C

Units	Content	Lecture Hours	COs	RBT
Unit I	**Introduction to Computer:** a. History of development of Computers. b. Concepts of Computer System, Characteristics; Capabilities and limitations. c. Generations of Computers. d. Basic components of Computer System	**5**	**C01**	**R** **U**
Unit II	**Storage Devices:** a. Storage fundamentals; Primary vs Secondary. b. Data Storage and Retrieval methods. c. Sequential, Direct and Index Sequential and Various Storage Devices	**5**	**C02**	**R** **U**
Unit III	**Word Processing - MS Word:** a. Introduction to Word Processing. b. Introduction to MS Word: Features. c. Creating, Saving and Opening documents in Word, Interface, Toolbars, Ruler, Menus, Keyboard, Shortcut. d. Editing a Document, Selecting, Inserting, Deleting, Moving text. e. Previewing documents, printing documents, shrinking a document to fit a page. f. Formatting Documents: Paragraph formats, Aligning Text and Paragraph, Borders and Shading, Headers and Footers, Multiple Columns.	**15**	**C03**	**R** **U** **A1** **A2** **E**
Unit IV	**Worksheet & MS Excel:** a. Worksheet basics, creating worksheet, entering data into worksheet, heading information, data, text, dates, cell formatting values, saving & protecting worksheet. b. Working with single and multiple workbook – coping, renaming, moving, adding and deleting, coping entries and moving between workbooks, c. Working with formulas & cell referencing, Formatting of worksheet. Previewing & Printing worksheet, Graphs and charts, various charts type, formatting grid lines & legends, previewing & printing charts.	**15**	**C04**	**R** **U** **A1** **A2** **E**

Unit V	**Presentation Graphics - MS Power Point** a. Features and various versions, Creating presentation using Slide master and template in various colour scheme, b. Working with different views and menus of power point, Working with slides. c. Drawing and inserting objects using Clip Art's pictures and charts. d. Custom Animation, slide transition effects and other animation effects.	**10**	**C05**	**R U A1 A2 C**
Unit VI	**Applications in Economics:** a. Population census versus sample surveys. b. Random sampling, Frequency distribution and summary Statistics, Data entry. c. Mathematical Functions, Financial functions, Statistical Functions. d. Creating simple Line, Bar and Pie charts, Simple two variable regressions.	**10**	**CO6**	**R U A1 A2 C**

Learning Resources:

- Rajaraman, V. (2014): Fundamental of Computer, Prentice Hall India Pvt. Limited, New
- Delhi. (CTB)
- Dubey, Manoj (2013): P C Packages, Kamal Prakashan, Indore.
- Mansoor, A. I. T. (2014): Tools and Applications, Pragya Publications, Matura.
- Ash Narayan Sah (2012): Data Analysis Using Microsoft, Excel Books, India. (CTB)

R: Remembering, U: Understanding, A1: Applying,A2: Analysing, E: Evaluating, C: Creating

6.3.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. Summative Assessment: 50 marks

ii. i. Theory paper of 50 marks, scaled down to 25 marks.(Time: 2 hours)

a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.

b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT.$5 \times 4 = 20$.

c. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$

ii. ii. Practical paper of 50 marks, scaled down to 25 marks. Marks distribution as follows:

a. Lab report: 10 marks b. Viva-voce: 10 marks c. Department/subject specific questions: 30 marks.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Ms. Ashiya Thapa Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:

(Seal) (Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

(College round seal in all pages)

6.4. Course Description

Course Code	23ECNVAC101
Course Title	Economic Debate and Discussion
Credits	1
Total Hours	30
Hours per Week	2
Course Type	Skill Enhancement Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	This course is designed to engage students in meaningful debates and discussions on various economic topics, enabling them to develop critical thinking skills and a deeper understanding of economic concepts. Through constructive debates and open dialogues, students will explore controversial issues, analyze multiple perspectives, and build their ability to formulate and defend informed opinions. This module aims to create a dynamic learning environment where students actively participate in analyzing real-world economic challenges and policy decisions.
Course Objectives	By the end of this course, students will: • Develop critical thinking skills by evaluating economic arguments, identifying logical fallacies, and analyzing complex economic issues from multiple viewpoints. • Deepen their understanding of fundamental economic concepts by applying them to realworld scenarios and debating their implications. • Improve their ability to communicate complex economic ideas persuasively and concisely in both written and verbal forms. • Enhance research skills through in-depth exploration of economic topics, data analysis, and evidence-based argumentation. • Cultivate an atmosphere of respectful and constructive debate, where differences in opinion are valued, and students learn to engage in civil discourse. • Cultivate an atmosphere of respectful and constructive debate, where differences in opinion are valued, and students learn to engage in civil discourse. • Apply economic principles to contemporary economic challenges and policy decisions, gaining practical insights into real-world economic issues. • Encourage independent thinking and the ability to question prevailing economic wisdom by examining the strengths and weaknesses of various economic theories and policies. • Develop a global perspective by exploring economic debates from international and cross-cultural angles, recognizing the interconnectedness of economies.

	• Synthesize knowledge gained throughout the module to critically evaluate the economic policies and decisions made by governments, organizations, and individuals.
Session 1: Introduction to economic debate. Importance of Economic Debates. Rules of constructive debates and respectful discourse. **Session 2:** Debate on economic systems – Capitalism vs Socialism vs mixed economies. Debate on importance of Government in an economy. Pros and cons of Economic systems. **Session 3:** Discussion on the causes and consequences of Income Inequality. Policy Debates on addressing Income Inequality. Discussion on role of taxation, minimum wages and wealth redistribution. **Session 4:** Debate on contemporary economic topics. **Session 5:** Debate on Economic Growth vs Environmental Sustainabiity. Debate on Sustainable Development. **Session 6:** Discussion on benefits and challenges of Globalisation. Debate on Free Trade vs Protectionism. Debate on the impacts of international trade on local industries and labour market. **Session 7:** Debate on Public vs Private healthcare systems. Debate on the current healthcare system in India. **Session 8:** Debate on contemporary economic topics. **Session 9:** Discussion on the role of education in economics development. Debate on Public vs Private education systems. Debate on the present education system in India. **Session 10:** Discussion on the minimum wage and labour market challenges in India. Discussion on the history of the plantation labour systems in the tea gardens in North Bengal. Discussions on contemporary challenges faced by the tea garden labours in the North Bengal region. **Session 11:** Debate on the impact of automation on employment. Debate on the role of technology on economics Development. **Session 12:** Debate on contemporary economic topics. **Session 13:** Discussion on Sustainable tourism. Debate on the impact of tourism in the North Bengal region. Urban tourism vs rural tourism. **Session 14:** Debate on emerging economic issues like climate change. Student-led debate on pressing economic topics. Reflection and takeaways. **Session 15:** Final discussion and feedback.	

6.4.1 Assessment

The course carries 25 marks. The evaluation will be done continuously by the course instructor based on the individual performance and participation of the students in each session. A final score will be tabulated and assigned by the end of the course bases on the evaluators observation through it.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Bickey Sharma Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:
	(Seal)	(Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

6.5. Course Description

Course Code	23ECNMAJ103
Course Title	Introductory Macroeconomics
Credits	4
Total Hours	60
Hours per Week	4
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	**This course:** a. Introducesmacroeconomics b. ExplainsNational IncomeAccounting c. Discussestheclassicaltheoryofmacroeconomics d. Explainsthefundamentals oftheKeynesiantheoryofincomeandemployment
Prerequisite	Students should have understanding of English language
Course Objectives	**The objectives of the course are to**: i. Enable students to define macroeconomics, understand its nature and to differentiate it from microeconomics. ii. Provide the students with the concept of national income accounting. iii. Provide the students with the understanding of the classical theory of macroeconomics. iv. Introduce and explain to the students the Keynesian theory of macroeconomics. v. Provide the students with the concept of the Keynesian Multiplier.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	DefineMacroeconomics and Differentiate it from Microeconomics.	R
CO2	DiscusstheconceptsofNational Income Accounting.	U
CO3	Explainthe Classical Theory of Income and Employment.	A1
CO4	Demonstrate deep understanding of the Simple Keynesian Model.	A2
CO5	Discuss the Simple Keynesian Multiplier	E

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Introduction to Macroeconomics:** a. Nature of Macroeconomics b. Scope and Importance of Macroeconomics c. Difference between microeconomics and macroeconomic.	**6**	**CO1**	**R U**
Unit II	**NationalIncomeAccounting:** a. Definitions of National Income, Concepts of GNI, GDP, GNP, NDP, NNP and NNP at factor cost and at market price, three methods of GNP b. Methods of measuring National Income, c. Difficulties in the measurement of National Income d. Price indices: CPI, WPI and GDP deflator, e. Nominal GNP and real GNP f. Saving-Investment gap and its relation with budget deficit and trade surplus. g. National income as a measure of welfare.	**15**	**CO2**	**R U A1 A2**
Unit III	**The Classical Theory:** a. Basic ideas ofClassicalMacroeconomics b. Say's Law c. Quantity Theory of Money, Loanable fund theory d. The Classical Theory of Income and Employment determination e. Full Employment and wage-price flexibility f. Classical Dichotomy and Neutrality of Money.	**10**	**CO3**	**R U A1 A2 E**
Unit IV	**The Simple Keynesian Model (SKM) ina Closed Economy**: a. The Simple Keynesian Model (SKM) in a Closed Economy without Government b. The Keynesian Consumption Function c. The Keynesian Saving Function d. Income determination in SKM e. Stability ofequilibrium f. The concept of effective demand- the concept of demand-determined output.	**15**	**CO4**	**R U A1 A2 E**
Unit V	**Multiplier:** a. The Simple Keynesian Multiplier b. Static vs. dynamic multiplier c. The paradox of thrift d. The SKM in a Closed Economy with	**14**	**CO5**	**R U A1 A2 E**

	Government; government expenditure and tax e. The government expenditure multiplier and the tax rate multiplier f. The balanced budget multiplier g. The budget surplus h. Effects of tax changesand government purchases on budget surplus i. The full employment budget			

Learning Resources:

- Ahuja, H. L. (2010). Modern Economics. S. Chand and Co. Ltd.
- Ackley, (CTB). Macroeconomic Theory and Policy, 2nd Edition.
- D'Souza, E. (2009). Macroeconomics. Pearson Education.
- Mankiw, N. Gregory. (2010). Macroeconomics, 7th Edition. Worth Publishers.
- Blanchard, Olivier. (2009). Macroeconomics, 5th Edition. Pearson Education, Inc.
- Dornbusch, R., & Fischer, S. (CTB). Macroeconomics, 4th Edition. McGraw Hill.
- Froyen, Richard T. (2005). Macroeconomics, 2nd Edition. Pearson Education Asia.
- Sikdar, S. (CTB). Principles of Macroeconomics. Oxford University Press.
- Branson, W. H. (2nd Edition). Macroeconomic Theory and Policy. All India Traveler Bookseller.
- Pal, Tapas Kr. (2018). Macroeconomics-Theory & Policy. Platinum Publisher, Kolkata.

6.5.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
c. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Bickey Sharma Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:

(Seal) (Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

(College round seal in all pages)

6.6. Course Description

Course Code	23ECNMAJ104
Course Title	Mathematical Economics - II
Credits	4
Total Hours	60
Hours per Week	4
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	**This course:** a. Covers and explores the concepts of difference equations. b. Explores the concepts of differential equations. c. Covers theory of games.
Prerequisite	Students need to have had studied either mathematics or business mathematics and business economics in class 12.
Course Objectives	**The objectives of the course are to**: i. Provide the students with the concept of first order differential equations and enable them to apply the same in economics. ii. Provide the students with the concept of second order differential equations and enable them to apply the same in economics. iii. Provide the students with the understanding of first order difference equations andenable them to apply the same in economics. iv. Provide the students with the understanding of second order difference equations and enable them to apply the same in economics. v. To provide the students with the understanding of the theory of games.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Demonstrate understanding of Differential Equations and apply it in Economics.	**R**
CO2	Explain the concept of second order differentials and apply it in economics.	**U &AI**
CO3	Solve problems involving first order difference equations and apply it in economics.	**A2**
CO4	Solve problems involving second order difference equations and apply it in	**E**

	economics.			
CO5	Explain the theory of games, solve problems involving games and apply the theory of games in economics.	**R**		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Differential Equations**: a. Definition of Differential Equation, Definition of First Order and Solution of First Order Differential Equations. b. *Applications in Economics*: Time Path of Price and Quantity in Comparative Markets, Time Path of Income in Simple Keynesian Model, Stability Model, Time Path of Inflation and Unemployment Rates, Harrod- Domar and Solow Growth Model.	**10**	**CO1**	**R U A1 A2 E**
Unit II	a. Definition of Second Order Differential Equation. b. Solution of Second Order Differential Equations and its applications in economics.	**10**	**CO2**	**R U A1 A2**
Unit III	**Difference Equations:** a. Definition of Difference Equation, Solution of Difference Equations, First Order Difference Equations. b. *Applications in Economics*: the Cobweb Model, the Dynamic Multiplier, Nature of the Time Path – A Graphical Analysis, Interpretation of the Time Path	**10**	**CO3**	**R U A1 A2 E**
Unit IV	a. Definition of Second order Difference Equation, Solution of Second order Difference Equations. b. Applications in Economics: The Multiplier Accelerator Interaction Model, Inflation and Unemployment in Discrete Case.	**10**	**CO4**	**R U A1 A2 E**
Unit V	**Theory of Games:** a. Introduction and Definition. b. Structure of Game, Pay-off Matrix, Two-Person Zero Sum Game, Non-Zero Sum Game. c. The Maximin and Minimax Principle, Games with an without Saddle Points.	20	**CO5**	**R U A1 A2 E**

	d. Dominance Property, Pure and Mixed Strategy, Graphical Solution of (2XN) and (MX2) Games.			

Learning Resources:

- Allen, R. G. D. Mathematical Analysis for Economics. Macmillan.
- Archibald, & Lipsey. An Introduction to the Mathematical Treatment of Economics. AITBS.
- Bailey, D. Mathematics in Economics. McGraw Hill.
- Baumol, W. J. Operations Research – An Introduction. Prentice Hall.
- Chiang, A. C., & Wainwright, K. Fundamental Methods of Mathematical Economics. McGraw Hill. (CTB)
- Dorfman, R. P., Samuelson, P. A., & Solow, R. M. Linear Programming and Economics Analysis. McGraw Hill.
- Geoff, Renshaw. Maths for Economics. OUP.
- Henderson, J. M., & Quandt, R. D. Micro Economic Theory – A Mathematical Approach. McGraw Hill. (CTB)
- Hoy, M., Livernois, J., McKenna, C., Rees, R., &Stengos, T. Mathematics for Economics. Prentice Hall.
- Mukherjee, B., & Pandit, V. Mathematical Methods for Economic Analysis. Allied.
- Silberberg, E. The Structure of Economics – A Mathematical Analysis. McGraw Hill. (CTB).
- Taha, H. A. Operations Research – An Introduction. Prentice Hall.
- Yamane, T. Mathematics for Economists – An Elementary Survey. Prentice Hall.
- Sydsæter, K., & Hammond, P. Mathematics for Economic Analysis. Pearson E. Asia, New Delhi. (CTB)

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

6.6.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
c. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Phu Tshering Sherpa Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:
	(Seal)	(Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

6.7. Course Description

Course Code	23ECNSEC102
Course Title	Travel and Tourism
Credits	2
Total Hours	45
Hours per Week	
Course Type	Skill Enhancement Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Economics
Regulation	2023
Course Overview	**This course:** a. Covers introduction of tourism. b. Discusses the measurement of Tourism. c. Covers Cultural Heritages in India. d. Discusses special interest tourism. e. Discusses tourism in North Bengal
Prerequisite	Students should possess proficiency in the English language and effective communication skills.
Course Objectives	**The objectives of the course are to:** a. To introduce the concept tourism to the students. b. To enable students explain the measurement of tourism. c. To enable students to discuss the cultural heritage in India. d. To provide students with the concept of special interest tourism. e. To enable students to discuss the tourism in North Benga.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Discuss tourism	R,U
CO2	Explain the concept of measurement of tourism	R,U,A1,A2
CO3	Discuss the cultural heritage of India	R,U,A1,A2,E
CO4	Explain special interest tourism	R,U,A1,A2,E
CO5	Critically analyse the tourism in North Bengal	R,U,A1,A2,E

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Definition of Tourism:** a. Definition of tourism, tourist, distinction between tourist and excursionist. b. Nature and scope of tourism management; functions of tourism management c. Historical development of tourism; Types of tourism, Forms of Tourism; Domestic tourism; International tourism; d. Tourism principle; Factors affecting the growth of tourism in India.	**8**	**C01**	**R** **U**
Unit II	**Measurement of Tourism:** a. Components of tourism, Tourism motivations, Tourism importance; b. Application of economics in tourism; c. Determinants of tourism demand and tourism supply; tourism demand forecasting and tourism supply forecasting; d. Employment and Income creation.	**10**	**C02**	**R** **U** **A1** **A2**
Unit III	**Cultural Heritage of India:** a. Archaeological sites of India, Monuments; Forts; Palaces, Historical importance building. b. UNESCO and World heritage sites in India: Religious sites in India. c. Pilgrimage tourism and its significance in tourism. Handicrafts in tourism: Fairs and festivals in India and its importance in tourism. .	**10**	**C03**	**R** **U** **A1** **A2** **E**
Unit IV	**Special Interest Tourism:** a. Tourism market; Health tourism, Ecotourism, Village tourism, Sustainable tourism; b. National parks; Wildlife & bird sanctuaries in India;	**10**	**C04**	**R** **U** **A1** **A2** **E**

	c. Desert tourism; Mountain tourisn; Beach tourism. d. Positive and Negative Impacts of Tourism; Socio cultural impact; Economic impact; Environmental and Ethnographical Impact.			
Unit V	**Tourism North Bengal:** a. Important tourism sites in W.B. Darjeeling and Dooars. b. Role of ecotourism in North Bengal	**7**	**C05**	**R U A1 A2 E**

Learning Resources:

- Sinha, P.C. (Ed.) Tourism Management (Vol. 4). [Include any additional information about the edition, if applicable, e.g., (2nd ed.)] CTB.
- Mill, J., & Morrison, A. Tourism Systems.
- Gartner, R. (Ed.). Tourism Development. [Include any additional information about the edition, if applicable, e.g., (3rd ed.)] CTB.
- Cooper, C., Fletcher, J., Gilbert, D., & Wanhill, S. Tourism: Principles and Practices.
- World Tourism Organization (WTO). Sustainable Tourism Development, Guide for Local Planners.
- Gupta, S.P., Lal, K., & Bhatacharya, M. Cultural Tourism in India. CTB.
- Lumsdon, L. Tourism Marketing.
- Holloway, J. C., & Robinson, C. Marketing for Tourism.
- Kotler, P. Marketing Management Analysis, Planning and Control. PHI.
- Kotler, P., & Armstrong, G. Principles of Marketing. PHI.
- Stanton, W. J. Fundamentals of Marketing. McGraw Hill.
- Bhattacharya, K. Sisir. Marketing Management. National Publishing House.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

6.7.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. Summative Assessment: 50 marks

ii. i Theory paper of 50 marks, scaled down to 25 marks. (Time: 2 hours)

a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.

b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.

c. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$

ii. ii. Project work of 50 marks, scaled down to 25 marks. Marks distribution as follows: a. Project report: 10 marks b. Viva-voce: 10 marks c. Department/subject specific questions: 30 marks.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Ms. Ashiya Thapa Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:

(Seal) (Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

(College round seal in all pages)

6.8. Course Description

Course Code	23ECNMN101
Course Title	Microeconomics
Credits	4
Total Hours	60
Hours per Week	4
Course Type	Minor
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Other than Economics Major
Regulation	2023
Course Overview	This course: a. Introduces economics b. Discusses the concepts of Demand and supply c. Covers the theory of Consumers Behaviour d. Covers the theory of producers Behaviour
Prerequisite	Students should possess proficiency in the English language and effective communication skills.
Course Objectives (total 5)	A student will be able to: i. Provide the students with the fundamentals of demand analysis. ii. Provide the students with the understanding of utility and consumption. iii. Enable students to understand the theory of production. iv. Enable students to understand the theory of cost. v. Enable students to understand the different types of market structures.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Explain the fundamentals of Demand theory.	R
CO2	Discuss the concepts of utility and consumption.	U
CO3	Discuss the theory of Production.	A1
CO4	Display the understanding of the theory of cost.	A2
CO5	Discuss the different types of market structure.	E

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Demand Analysis:** a. Definition of Demand b. Determinants of Demand, Demand Curve and Demand Function, Law of Demand. c. Measurement of Own price	**15**		**R U**

	elasticity of Demand, Cross price elasticity of Demand and Income elasticity of Demand. d. Factors determining Elasticity of Demand.			
Unit II	**Consumption and Utility:** a. Definition of Total Utility (TU) and Marginal Utility (MU), Relationship between TU and MU, b. Law of Diminishing Marginal Utility, c. Condition of Equilibrium of the Consumer. d. Indifference Curve Analysis: Definition and Characteristics of Indifference Curve (IC). e. Marginal Rate of Substitution (MRS), Budget Line, Consumer's Equilibrium, f. Price Effect, Income Effect, Substitution Effect, Consumer Surplus.	**15**	**CO2**	**R U A1 A2**
Unit III	**Theory of Production:** a. Definition of Production Function. b. Definition of Total Product (TP), Average Product (AP) and Marginal Product (MP), c. Derivation of AP and MP from TP Curve. d. Law of Variable Proportions, Producer's equilibrium, Expansion Path, Laws of Returns to Scale.	10	**CO3**	**R U A1 A2 E**
Unit IV	**Theory of cost:** a. Fixed Cost and Variable Cost, Average Cost and Marginal Cost, Shape of Cost Curves, Relation between Average Cost and Marginal Cost. b. Definitions of Total Revenue (TR), Average Revenue (AR) and Marginal Revenue (MR) and relationship among AR, MR and Price Elasticity of Demand.	10	**CO4**	**R U A1 A2 E**
Unit V	**Perfect and Imperfect Competition:** a. Classifications of Markets, Characteristics of Perfect Competition, Short-run and Long-run Equilibrium of the Firm, Short run Supply Curve of the Firm, Price Determination in a Perfectly Competitive Market.	10		**R U A1 A2 E**

	b. Monopoly: Characteristics, Price and Output Determination in Monopoly, Basic Concepts of Price Discrimination. c. Characteristics of Monopolistic Competition, Oligopoly and Duopoly markets.			

Learning Resources:

- Ahuja, H.L. (2010): Modern Economics, S. Chand and Co. Ltd.
- Ferguson and Gould (2001): Microeconomic Theory, published by All India Traveller Book Seller.
- Joseph E. Stiglitz and Carl E. Walsh (2007): Economics, W.W. Norton & Company, Inc., New York, International Student Edition, 4th Edition.
- Karl E. Case and Ray C. Fair (2007): Principles of Economics, Pearson Education Inc., 8th Edition.
- Lipsey, R.G. (1963): An Introduction to positive Economics, Weidenfeld and Nicholson, London.
- N. Gregory Mankiw (2007): Economics: Principles and Applications, India edition by South Western, a part of Cengage Learning, Cengage Learning India Private Limited, 4th edition.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

6.8.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. $2 \times 5 = 10$.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
c. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Bickey Sharma Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:

(Seal) (Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

(College round seal in all pages)

6.9. Course Description

Course Code	23ECNMDC101
Course Title	Microfinance
Credits	3
Total Hours	45
Hours per Week	3
Course Type	MDC
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	The students who haven't studied economics in their higher secondary level and do not have economics as their major or minor papers.
Regulation	2023
Course Overview	**This course:** a. Provides a comprehensive understanding of microfinance as a powerful tool for economic development. It explores the concept, history, and significance of microfinance in global and Indian contexts. Examine its impact on poverty alleviation and community development. b. Delves into the diverse microfinance models implemented in India, including Self-Help Groups (SHGs), the Grameen Model, ROSCA Model, Chit Funds, Village-Based Model, Intermediary Model, Cooperative Model, and Community Banking Model. c. Focuses on the intersection of financial inclusion and microfinance. Students will explore the relevance of financial inclusion for overall development, the importance of financial literacy, and the essential components of financial counselling d. Provides an in-depth examination of prominent financial inclusion schemes in India, including Pradhan Mantri Jan Dhan Yojana (PMJDY), Atal Pension Yojana (APY), Pradhan Mantri Mudra Yojana (PMMY), Sukanya Samridhi Yojana (SSY), and Pradhan Mantri Suraksha Yojana (PMSY).
Prerequisite	Students should possess proficiency in the English language and effective communication skills.
Course Objectives	**A student will be able to:** a. Understand the concept of microfinance and its role in fostering economic development.

	b. Understand the various microfinance models and their distinctive features. c. Emphasize the significance of financial inclusion in promoting economic development. d. Know the important financial inclusion schemes implemented by the Indian government.

Course Outcomes based on RBT and Cognitive Level Mapping

At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand the fundamental principles and objectives of microfinance.	R
CO2	Gain an in-depth understanding of multiple microfinance models and their operational mechanisms.	U
CO3	Identify the key components of financial literacy and their role in enhancing financial access	A1 & A2
CO4	Understand the objectives and features of major financial inclusion schemes in India.	E & C

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	a. Microfinance as a tool for development, b. Evolution of microfinance in India, c. Microfinance products and services, d. Intermediation and Regulations of Microfinance, Microfinance, and Livelihood options.	**9**	**CO1**	**R U A1 A2 E C**
Unit II	a. Microfinance models in India: SHGs, Grameen Model, ROSCA model or Chit Funds. b. Village Based Model, Intermediary Model, Co-operative Model,	**12**	**CO2**	**R U A1 A2 E C**

	Community Banking Model. c. Differences Between SHG and JLG Model. d. Indian SHG: Problems and Issues. e. SHG-Bank Linkages programmed in India			
Unit III	a. Financial inclusion and rural credit: b. Rural credit– concept, need. c. Characteristics and sources of rural credit. d. Institutional and non-institutional rural credit–money lenders, cooperatives. Regional Rural Banks, Commercial Banks, NABARD	**12**	**CO3**	**R U A1 A2 E C**
Unit IV	a. Financial Inclusions Schemes in India: Pradhan Mantri Jan Dhan Yojana (PMJDY). b. Atal Pension Yojana (APY). c. Pradhan Mantri Mudra Yojana (PMMY). d. Sukanya Samridhi Yojana (SSY). e. Pradhan Mantri Suraksha Yojana (PMSY).	**12**	**CO4**	**R U A1 A2 E C**

Learning Resources

- Bhaskaran, R. Microfinance: Perspectives and Operations. Macmillan Education.
- Bhatnagar, A. Rural Microfinance and Microenterprise: Informal Revolution. Concept Publishing Company.
- Carol Realini. Financial Inclusion at the Bottom of the Pyramid. FriesenPress.
- Chakrabarty, K. C. Financial Inclusion and Banks: Issues and Perspectives. RBI Bulletin
- Debadutta K. Panda. Understanding Microfinance. Wiley India.
- Gangadharan, K. Financial Inclusion and Inclusive Growth: Scope and Dimension. Reference Press.
- Indian Institute of Banking & Finance. Micro-Finance: Perspectives and Operations. Taxmann Publications.

- Matthaus-Maier, I., & Von Pischke, J. D. Microfinance Investment Funds: Leveraging Private Capital for Economic Growth and Poverty Reduction. Springer.

- Karmakar, K. G., Banerjee, G. D., & Mohapatra, N. P. Towards Financial Inclusion in India.

R: Remembering, U: Understanding, A1: Applying,A2: Analysing, E: Evaluating, C: Creating

6.9.1. Assessment

ii. ***Formative Assessment*:** 50 marks as per Assessment & Evaluation Framework Document of Salesian College

iii. ***Summative Assessment*:** 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. 2 × 5 = 10.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. 5 × 4 = 20.

d. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. 10 × 2 = 20

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Palzor Dukpa Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:
	(Seal)	(Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Ms. Decha Kumari Signature:		

6.10. Course Description

Course Code	23ECNMDC102
Course Title	Public economics and policy analysis
Credits	3
Total Hours	45
Hours per Week	3
Course Type	MDC
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	The students who haven't studied economics in their higher secondary level and do not have economics as their major or minor papers.
Regulation	2023
Course Overview	**This course:** a. Introduces students to the principles of public economics and the analysis of government policies. b. Covers topics such as taxation, public spending, fiscal policies, public policy evaluation, and implementation. c. Provides students with a foundation for understanding how governments allocate resources and make policy decisions.
Prerequisite	Students should possess proficiency in the English language and effective communication skills.
Course Objectives	**A student will be able to:** a. **Understand the scope and significance of public economics in the context of economics as a whole**. b. Understand the tax system, revenue and policies. c. Know about the tax incidence, tax efficiency and resource allocation. d. Understand the public policy evaluation and implementation

Course Outcomes based on RBT and Cognitive Level Mapping

At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping

CO1	Define public economics and explain the role of government in market efficiency.	R
CO2	Explain the different types of taxes and policies of the governments.	U
CO3	Apply the principles of taxation and analyze their relevance in designing an efficient tax system	A1 & A2
CO4	Evaluate economic rationalism behind public spending in areas such as education, healthcare, and infrastructure and suggest a effective measures of implication.	E & C

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Introduction to Public Economics** a. Overview of public economics b. Role of government in the economy c. Market failures and public goods	**9**	**CO1**	**R U A1 A2 E C**
Unit II	**Taxation, Public Revenue, and Fiscal Policies** a. Types of taxes (income, sales, property, etc.) b. Tax incidence and efficiency c. Principles of taxation d. Fiscal policy tools and objectives	**12**	**CO2**	**R U A1 A2 E C**
Unit III	**Public Spending and Resource Allocation** a. Government expenditure categories b. Budgeting and resource allocation c. Public goods provision	**12**	**CO3**	**R U A1 A2 E C**
Unit IV	**Public Policy Evaluation and Implementation** a. Policy analysis and evaluation techniques	**12**	**CO4**	**R U A1 A2**

	b. Cost-benefit analysis c. Policy implementation challenges d. Case studies of policy success and failure			**E** **C**

Learning Resources:

- Gruber, J. *Public Finance and Public Policy*.
- Stiglitz, J. E., & Rosengard, J. K. *Public Economics*
- Rosen, H. S., & Gayer, T. *Public Finance*
- Pratt, J. W., & Kulsrud, W. N. *Taxation: Policy and Practice*
- Hirsch, A. M. R. *Public Economics and the Quality of Life*
- Tresch, R. W. *Public Finance*.
- Weimer, D. L., & Vining, A. R. *Policy Analysis: Concepts and Practice*
- Clark, S. G., & Elliott, R. J. R. *The Policy Process: A Practical Guide for Natural Resources Professionals*

R: Remembering, U: Understanding, A1: Applying,A2: Analysing, E: Evaluating, C: Creating

6.10.1 Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment***:** 50 marks (Time: 2 hours)

Marks distribution as follows:
a. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of RBT. 2 × 5 = 10.
b. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. 5 × 4 = 20.

a. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. 10 × 2 = 20

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr. Palzor Dukpa Signature:	Mr. Bickey Sharma Signature:	Mr. Subhajit Paul Signature:
	(Seal)	(Seal)

External Subject Expert	**External Subject Expert**	**Industry Expert**
Prof Jeta Sankrityayana Signature:	Dr. Shanti Chhetry Signature:	Mr. Swaraj Kumar Banerjee Signature:
Alumni		
Signature:		

Curriculum for Literature Review
Value Added Course
Sem- II

Week 1: Introduction to Literature Review

- Understanding the importance of literature review in research
- Types of literature reviews
- Defining research questions and objectives

Week 2: Search Strategies

- Database selection and search techniques
- Boolean operators and advanced search syntax
- Utilizing bibliographic management tools (e.g., Zotero, EndNote)

Week 3: Evaluating Sources

- Criteria for evaluating the credibility and reliability of sources
- Differentiating between primary and secondary sources
- Identifying biases and limitations in research

Week 4: Synthesizing Literature

- Techniques for organizing and categorizing literature
- Creating annotated bibliographies
- Identifying gaps and patterns in existing literature

Week 5: Critical Analysis

- Understanding theoretical frameworks and methodologies
- Analyzing arguments, methodologies, and conclusions
- Developing a critical stance towards existing research

Week 6: Writing Literature Reviews

- Structuring a literature review
- Incorporating synthesis and critical analysis into writing
- Avoiding plagiarism and maintaining academic integrity

Week 7: Advanced Search Techniques

- Utilizing advanced search features in specific databases
- Exploring grey literature and alternative sources

- Incorporating interdisciplinary perspectives

Week 8: Systematic Literature Reviews

- Understanding the process and principles of systematic reviews
- Conducting systematic searches and screening studies
- Assessing the quality of evidence in systematic reviews

Week 9: Literature Review in Practice

- Workshops on refining research questions
- One-on-one consultations for individual projects
- Peer review and feedback sessions

Week 10: Presenting and Publishing Literature Reviews

- Strategies for presenting literature reviews in different formats (e.g., papers, posters, presentations)
- Navigating the publication process
- Ethical considerations in publishing literature reviews

Course Code	24GEOVAC101
Course Title	Fit India
Credits	2
Total Hours	45
Category	VAC
Intended Level	Certificate
Issue(s) Addressed	
Course offered to	Others
Semester	II
Regulation	2024

Course Overview:

This Course –

- Covers the importance of participation in physical activities.
- Explains the importance of healthy eating and balanced diet.
- Covers health related fitness

Course Objectives:

The objectives of the course are-

1. Encouraging physical activity through engaging the students' in sports and yoga.
2. Understanding the importance of balanced diet.
3. Build skills of self – discipline, self – confidence, cooperation and team work.
4. Promote fitness as a joyful activity.

Course outcomes are based on RBT and Cognitive Level Mapping

At the end of the course, the students will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Adopting a healthy lifestyle	U, R
CO2	Knowledge of nutrition, diet and psycho – physiological aspects of fitness.	U, C, A1
CO3	Development of self – esteem, self – confidence, self – discipline as indicators of fitness.	A1, A2

COURSE CONTENT

UNITS	CONTENT	HOURS	COs	REVISED BLOOM'S TAXONOMY
Unit I	Participation in Physical Activity a. Fit India Protocol b. Physical Activity, Health and Fitness c. Indicators of Fitness	10	CO1	UR
Unit II	Nutrition and Fitness a. Healthy Eating b. Balanced Diet c. Caloric content of food	10	CO2	U C A1
Unit III	Health Related Fitness a. Muscular strength and endurance b. Body Composition and Flexibility.	25	CO3	A1A2

Reading List

1. Charles B. Corbin, Gregory J Welk, William R Corbin, Karen A Welk: Concepts of Fitness and Wellness- A Comprhensive Lifestyle Approach. McGraw Hill (2015)
2. Websites of International Sports Federation
3. Website of Ministry of Youth Affairs and Sports.

ASSESSMENT SCHEME

Formative Assessment & Summative assessment

Subject to directions from the Examination Branch (Salesian College, Autonomous) from time to time.

Course Faculty (Prepared by)	Head of the Department (Checked and verified by)	Dean (Approved by)
Name: DR. SRASHTA CHOWDHURY	Name: SRIJANA SINHA	Name:
Signature: 04/06/2024	Signature: HEAD 4/06/2024	Signature: 4/06/24 DEAN
	Department of Geography Salesian College (Autonomous) Siliguri	Arts & Humanities Salesian College (Autonomous) Sonada & Siliguri

Course Code	**24COMVAC101**
Course Title	**Social Media Marketing**
Credits	**2**
Practical hours **Hours/Week**	**60** **2**
Category	**Value Added Course (VAC)**
Semester	**I**

Regulation	**2024**

Course Overview:

This course –

Aims to provide students with the basic knowledge of marketing and give them a brief knowledge about social media and various platforms used in social media marketing.

Course Objectives:

The students will be able to –

- Know the importance of marketing in the present scenario.
- Know the importance of various platforms used in social media marketing.
- Get practical knowledge about the impact of social media marketing on consumer behavior by conducting a minor research.

Prerequisites: Basic knowledge of tools and techniques used in conducting research.

Syllabus

UNITS	CONTENT	HOURS	COs	CLs

UNIT – I	Introduction to Marketing, Marketing Concepts- Marketing process, Marketing mix. Market segmentation and targeting and positioning. Consumer Behaviour	**6**	CO1	U
UNIT – II	Fundamentals of Social Media Marketing and its significance, Necessity of Social media Marketing. Facebook Marketing, LinkedIn Marketing and Twitter Marketing	**6**	CO2	U
UNIT – III	Data Collection, Sources of data-Primary and secondary data, Sampling Methods, Data tabulation.	**6**	CO3	A2
Practical Component	1. Students need to prepare questionnaires to understand the impact of social media marketing on consumer behavior. 2. Conduct a survey and collect data from the respondents 3. Data tabulation 4. Final presentation by the students on the research conducted by them.	12		

Learning Resources:

1. Digital Marketing –Kamat and Kamat-Himalaya
2. Marketing Strategies for Engaging the Digital Generation, D. Ryan,
3. Digital Marketing, V. Ahuja, Oxford University Press
4. Kothari CR, Research Methodology-Methods and Techniques, New Wiley Eastern Ltd., Delhi, 2009 5.

Digital Marketing, S.Gupta, McGraw-Hill

Course Outcomes (Cos) and Cognitive Level Mapping

At the end of this course, the students will be able to

COs	STATEMENTS	REVISED BLOOM's LEVEL
CO1	Understanding the basic concepts related to marketing	U

CO2	Understanding the importance of social media marketing and the various platforms used in social media marketing.	**U**
CO3	Conducting a minor research to understand the impact of social media marketing on consumer behavior	**A2**

2. Assessment

1. Formative Assessment: 50 marks (50% Weightage) as per Assessment & Evaluatio Framework Document of Salesian College

2. Summative Assessment: 50 marks (50% Weightage) as per Assessment & Evaluati Framework Document of Salesian College

Course Faculty (Prepared By)	**Head of the Department** (Checked and verified)	**Dean** (Approved By)	**University Nominee** (Approved By
Name- RISHA CHETTRI **Signature-** Chettri	**Name-** RISHA CHETTRI **Signature-** Chettri	**Name-** **Signature-**	**Name-** **Signature-**

Academic Expert	**Industry Expert**	**Alumni**
Name- ① SUMAN SARKAR ② Dr. Praveen Chakr **Signature-** ① 3/11/21 ② 03/11/21	**Name-** AGNISHWAR BASU **Signature-** Agnishwar Basu	**Name-** **Signature-**

SEMESTER 2

Value Added Course

Course Code	23COMVAC102
Course Title	Sustainable Business Management
Credits	1
Practical hours Hours/Week	30 2
Category	Value Added Course (VAC)
Semester	2
Regulation	2024

Course Overview:
This course –

Aims to provide students with the basic knowledge of sustainibilty management and give them a comprehensive knowledge on the signifance of sustainibility in various dimensions.

Course Objectives:
The students will be able to –

- Have a comprehensive knowledge about sustainability and its dimensions.
- Know regarding the sustainable practices undertaken by organization
- Understand the global significance of sustainability management and means of doing it through case studies.

Prerequisites: Basic knowledge of tools and techniques used in conducting research.				
Syllabus				
UNITS	**CONTENT**	**HOURS**	**COs**	**CLs**
UNIT – I	Overview of Sustainibility-Triple bottom line approach-people,planet and profit,meaning and need for sustainability management,sustainability development goals,Advantages and Challenges to sustainability management	**6**	CO1	U
UNIT – II	Understanding the People aspect of Triple bottom line-Meaning and Significance of CSR,Need for CSR and its benefits to organization,CSR reporting.	**6**	CO2	U
UNIT – III	Understanding the Planet and Profit aspect-Sustainable practices and environmental protection,Sustainable value chain,Life cycle assessment,Stakeholder Vs Shareholder,business ethics and sustainability.	**6**	CO3	A2
Practical Component	Case studies of organizations in CSR,sustainable value chains,life cycle assessment(sustainable practices)	12		

Learning Resources:

1. Corporate Social Responsibility, Edited by CV Baxi and Ajit Prasad
2. Corporate Social Responsibility and Sustainable Development,Edited by M. Soundarapandian
3. Business strategies for sustainable development by International Institute for sustainable development (online resource)
4. Handbook on CSR by CII (online resource)

Course Outcomes (Cos) and Cognitive Level Mapping

At the end of this course, the students will be able to

COs	STATEMENTS	REVISED BLOOM's LEVEL
CO1	Understanding the basic concepts related to sustainability management	**U**
CO2	Understanding the importance of sustainability across various dimensions	**U**
CO3	Conducting a case study to understand the impact of sustainibilty on businesses	**A2**

SEMESTER – I: Understanding Social Phenomena : A Visual Study- I

VAC - I

Hours:30
Session:15
Credits: 01

Objectives:

Visual is one of the crucial dimensions of social reality. As one of the senses in human body is visual which helps us to behave and act in relation to what we observe. Further, the modern technology has deeply extended the visual abilities, the experiences of the individual has also changed accordingly towards social reality.
The course aims to impart the basic knowledge of visual and its construction of social reality. It helps the students to understand the society with modern visual tools indulging them in practical experiences for unearthing various social phenomena. Meanwhile this course has designed to fulfill the criteria set by NEP for a Value-added Course (VAC).

Detailed Module:

SESSION 1	Introducing the Visual importance for understanding the social reality through the usages of photographs, images, Videos, Vlog etc. (Using the phones).
SESSION 2	Giving the understanding of the Topics in relation to societal importance.
SESSION 3	Ideas for formulating the pattern for the visual traits project (including narrative writings)
SESSION 4	Submission of individual model of visual pattern for project.
SESSION (5-6)	Presenting (ppt) on any of the topic for understanding the ability of the students.
SESSION 7	Selection and finalizing of the given Topic (s) with feasibility and accessibility.
SESSION (8-10)	Finding the universe according to the given social reality and visually capturing the observed reality [visit to undertaken topic (s) field/ area].
SESSION(11-15)	Presentation of the compiled data with narratives on selected topic (s)

SEMESTER-II: Understanding Social Phenomena: A Visual Study-II

VAC-II

Hours: 30
Session:15
Credits: 01

Objectives:

Visual sociology attempts to study visual images produced as part of culture. Art, photographs, film, video, fonts, advertisements, landscape, architecture, machines, fashion, makeup, hairstyle, facial expressions, tattoos, and so on are parts of the complex visual communication system produced by members of societies. The use and understanding of visual images is governed by socially established symbolic codes.
The course aims to study the social problems through some documentaries and it will help the students to write review and reflections of what they have observed to understand the social reality. Meanwhile this course has designed to fulfil the criteria set by NEP for Value-added Course (VAC-II)

Detailed Module:

SESSION 1: Introducing the visual importance for understanding the social reality through the uses of documentary videos, images, etc.

SESSION 2: The understanding social problems like poverty, child labour, environmental issues etc.

SESSION 3: Ideas of formulating the pattern for the visual traits project. (Including narrative writing, understanding their perspectives, visual importance etc.)

SESSION 4 -7: Writing reviews and reflections

SESSION 8- 13: Presenting (ppt) on any of the topic individually.

SESSION 14- 15: Submission of the final reports of all.

Salesian College Siliguri (Autonomous)

Department of Political Science

Semester I

Value Added Course (VAC)

Political Debates: Issues and Concerns - I

Total Hours: 30

Sessions: 15 (2 hours each)

Credits: 2

Objectives

The Value added Course of **Political Debates: Issues and Concerns - I** aims to inculcate the skills of critical thinking, research and public speaking among the students. This will enable leadership skills, the art of debate, discussion and negotiation which is an integral component of the discipline of Political Science. The course intends to encourage students to take debate as a positive form of human interaction shaping the course of policy making/decision making in a polity.

Detailed Module

Session 1:	**Understanding Debates and Discussion**: Students will learn the importance of debates and discussions in politics. For this purpose some open group discussions on contemporary issues will be conducted. Students will also be taught the rules, techniques of debates and rebuttal.
Session 2:	**Debate Topic:** Reservation policy in India
Session 3:	**Debate Topic:** Caste and Politics
Session 4:	**Debate Topic:** Regionalism in India
Session 5:	**Debate Topic:** Uniform Civil Code
Session 6:	**Debate Topic:** One Nation, One Election

Session 7:	**Debate Topic:** Article 370
Session 8:	**Debate Topic:** LGBTQA+
Session 9:	**Debate Topic:** New Education Policy
Session 10:	**Debate Topic:** Russia –Ukraine crisis
Session 11:	**Debate Topic:** Human Rights
Session 12:	**Debate Topic:** Women reservation policy in India
Session 13:	**Debate Topic:** Sustainable Development
Session 14:	**Debate Topic:** Media and Politics
Session 15:	**Debate Topic:** Globalization and State

Mode of Evaluation: Practical

Salesian College Siliguri (Autonomous)

Department of Political Science

Semester II

Value Added Course (VAC)

Political Debates: Issues and Concerns - II

Total Hours: 30

Sessions: 15 (2 hours each)

Credits: 2

Objectives

The Value added Course of **Political Debates: Issues and Concerns - II** aims to inculcate the skills of critical thinking, research and public speaking among the students. This will enable leadership skills, the art of debate, discussion and negotiation which is an integral component of the discipline of Political Science. The course intends to encourage students to take debate as a positive form of human interaction shaping the course of policy making/decision making in a polity.

Detailed Module

Session 1:	**Understanding Debates and Discussion**: Students will learn the importance of debates and discussions in politics. For this purpose some open group discussions on contemporary issues will be conducted. Students will also be taught the rules, techniques of debates and rebuttal.
Session 2:	**Debate Topic:** Regional Movements
Session 3:	**Debate Topic:** Caste and Politics
Session 4:	**Debate Topic:** Civil Disorders
Session 5:	**Debate Topic:** Secularism: Recent Developments
Session 6:	**Debate Topic:** Electoral Reforms in India
Session 7:	**Debate Topic:** Migration and regional imbalance

Session 8:	**Debate Topic:** LGBTQA+: Legal Perspectives
Session 9:	**Debate Topic:** New Education Policy: Pros and Cons
Session 10:	**Debate Topic:** Russia –Ukraine crisis (Recent Developments)
Session 11:	**Debate Topic:** Women Rights In India
Session 12:	**Debate Topic:** Reservation policy in India
Session 13:	**Debate Topic:** Sustainable Development: Indian Perspective
Session 14:	**Debate Topic:** Politicisation of media
Session 15:	**Debate Topic:** Globalization: Advantages and disadvantages

Mode of Evaluation: Practical

Salesian College

(Autonomous)
Sonada - Siliguri

National Education Policy (NEP) 2020 Curriculum Framework

For

Bachelor of Arts in English

Department of English

Curriculum Document
2023 – 2024

Vision:

The Department of English, Salesian College (Autonomous) envisages empowering the students to develop and build knowledge of the content and methods of literary studies, academic, professional, creative and critical reading/ writing, thereby championing in undergraduate/ postgraduate research, knowledge creation, and reaching to the marginalized.

Mission:

1. To provide appropriate pedagogies in keeping with the signs of the time
2. To help students develop criticality of the text by way of presenting/writing research papers for (inter)national symposia, conferences etc
3. To give students a sense of themselves as citizens of a larger community by encouraging participation in service learning
4. To assure that students encounter creativity crucial to English studies through theatre productions, readings by professional writers, and their own creative and critical production and presentation.
5. To balance the needs of general education – communication, diversity, global perspectives, inter(trans)disciplinary studies
6. 6. To value faculty scholarship and service through greater support for and participation in activities of the profession.

1. Programme Overview

Bachelor of Arts in English is a four-year degree programme with the possibility of completing the fourth year with research if a particular student secures 75% CGPA in the previous exams.

2. Programme Objectives and Outcomes (POs)

After completion of the programme, a student will be able to:	
Knowledge	PO01: Acquaint oneself with the history of English literature and understand its social, political, and historical context(s).
	PO02: Gain understanding of the growth of diverse literatures and the English language.
	PO03: Relate one's understanding to explore identity, values, manners, and morals through different engagements
	PO04: Grasp literary forms, types, literary theory and gain an alternate understanding of the contemporary issues of the modern world.
Skills	PO05: Demonstrate his/her critical understanding of texts and issues through presenting/writing research papers for (inter)national symposia, conferences etc.
	PO06: Construct writing projects like essays, short-stories, poems
	PO07: Develop presentation skills with discussions, debates, public-speaking, and integrating ICT.
	PO08: Acquaint oneself with the diverse current issues like environmental crisis, climate change, gender discrimination, marginality, and politics through reading of relevant literature.
Competence	PO09: Explore new/revised understanding of issues through the application of literary and cultural theories.
	PO10: Initiate self-sufficiency, sincerity, independent thinking as research and education is a lifelong process for empowering the student to face all challenges in their future endeavours, and develop new ideas and new understanding.
	PO11: Develop concern for the society and nation through understanding of regional and vernacular literatures and comparing our literary content, themes, and usage of language with that of literatures of other developing countries.

3. Programme Specific Objectives& Outcomes (PSOs)

Knowledge	PSO1: A student develops a clear idea about the details of the history, development and growth of English language.
	PSO2: A student gathers knowledge about the content, context, and nature of the subject
	PSO3: A student develops knowledge about the detailed history of English literature from Old English Period to 20th century
	PSO3: A student develops knowledge about the social, political, historical and economical movements that helped shaped literature, and also trace the development of human civilization and culture under these fields.
	PSO4: A student develops knowledge about the interconnections and interrelations across disciplines and cultures by studying world literatures including Indian writing in English.
	PSO5: A student develops knowledge about the gendered aspect of writing and gain awareness about the issues and concerns of women writers and women's writing as a separate genre.

	PSO6: A student develops understanding of different concepts like Modern/Modernity/Modernism amongst others.
	PSO7: A student develops understanding of critical literary and cultural theories to interpret and analyze texts.
Skills	PSO1: A student will develop the skills required for Creative Writing.
	PSO2: A student will develop presentation skills with discussions, debates, public-speaking, and integrating ICT.
	PSO3: A student will exhibit and awareness with the diverse current issues like environmental crisis, climate change, gender discrimination, marginality, and politics through reading of relevant literature.
	PSO4: A student will develop critical aptitude to write research papers and present them in conferences of different levels.
	PSO5: A student will develop the ability to interpret older texts from contemporary point of view.
	PSO6: A student will gain awareness of connection between literary and political movements impacting different literary eras and movements.
	PSO7: A student will develop critical thinking skills through various literary and cultural theories.
Competence	PSO1: A student will be able to apply critical literary theory to formulate arguments about literary and other critical texts as well as contemporary cultural practices.
	PSO2: A student will be able re-interpret society and culture through the theoretical lens developed by philosophers and literary theorists.
	PSO3: A student will be able to question the problems of identity through text.
	PSO4: A student will be able to locate ad represent subaltern voices through their own writings.
	PSO5: A student will envision a society where diverse people irrespective of gender, caste, religion and sexuality, coming from various backgrounds enjoy equal and equitable rights and opportunities.
	PSO6: A student will be able to demonstrate his/her critical understanding of texts and social issues through presenting/writing research papers and designing research proposals.
	PSO7: A student will analyse the contemporary trends in literatures both English and vernacular.

4. Programme Matrix

Semester	**Course Code**	**Course Type**	**Title of the Course** (40 characters including space)	**Credit**	**Lecture Tutorial Practical (L+T+P)**	**Total Honours**	**Total Marks**
I	23ENGMAJ101	Major	History of English Literature	4	4+0+0	60	100
	23ENGMAJ102	Major	Literary Types & Growth of the Language	4	4+0+0	60	100
	23ENGMIN101	Minor	Selections from Indian Literature	4	4+0+0	60	100
	23ENGMDC101	MDC	Business English	3	3+0+0	45	75
	23ENGAECE101	AEC	Compulsory English	2	2+0+0		50

	23ENGSEC101	SEC	English Phonetics & Pronunciation	3	2+0+1	45	75
	23ENGVED101	VED	Value Education	1			25
	23SCSVAC1/ 23ENGVAC101	VAC	Theatre and Theatrics/ Remedial Grammar	1			25
	Total			22			
Semester	**Course Code**	**Course Type**	**Title of the Course** (40 characters including space)	**Credit**	**Lecture Tutorial Practical (L+T+P)**	**Total Honours**	**Total Marks**
II	23ENGMAJ103	Major	Chaucer to Shakespeare	4	4+0+0	60	100
	23ENGMAJ104	Major	Indian Literature in English	4	4+0+0	60	100
	23ENGMIN102	Minor	Selections from British Literature	4	4+0+0	60	100
	23ENGMDC102	MDC	Writing and Reading Skills	3	3+0+0	45	75
	23ENGAECE102	AEC	Alternative English	2	2+0+0		50
	23ENGSEC102	SEC	Aspects of Editing	3	2+0+1	45	75
	23ENGVED101	VED	Value Education	1			25
	23SCSVAC1/ 23ENGVAC102	VAC	Theatre and Theatrics/Writing Skills	1			25
	Total			22			

Course Content

1. Course Description

Course Code	**23ENGMAJ101**
Course Title	**History of English Literature**
Credits	**4**
Total Hours	**60**
Hours per Week	**4**
Course Type	**Major**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**N/A**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course will:** a. Provide with introduction to English literature. b. Give an overview of major literary currents spanning from the old English age to the postmodern age. c. Help the students have an idea of the major philosophers and authors. d. Make the students understand the position of literature as a social art.
Prerequisite	Proficiency in the basics of Literature and Language in English
Course Objectives	**A student will be able to:** a. Understand comprehensively the history of English literature. b. Remember major literary and philosophical schools. c. Analyse literature as a domain of art and theory. d. Evaluate the major authors and their canonical works.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand comprehensively the history of English literature.	**R** **U**
CO2	Remember major literary and philosophical schools.	**R** **U**
CO3	Analyse literature as a domain of art and theory.	**R** **A1**
CO4	Evaluate the major authors and their canonical works.	**A2** **E**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Old and Middle English** a. Overview b. Socio-Political background c. Noted authors and their works	**12**	**CO1 CO2 CO3 CO4**	**R U**
Unit II	**Age of Chaucer** a. Overview of the age b.Noted works c.Literary importance **Age of Elizabeth** a. Historical overview b.Noted authors and their works c. Literary importance	**12**	**CO2 CO3 CO4**	**R U A2 E**
Unit III	**Age of Milton** a. Historical and literary overview b.Noted works c. Literary importance **Age of Dryden and Pope** a. Historical and literary importance b. Social background c. Noted works and their importance	**12**	**CO1 CO2 CO3 CO4**	**R U A2 E**
Unit IV	**Age of Wordsworth** a. Philosophical outlook b. The Romantic Turn c. Notable publications, their impact and importance **Victorian age** a. Important works b. Literary and Cultural changes c. Industrial Revolution and its impact	**12**	**CO1 CO2 CO3 CO4**	**R U A2 E**
Unit V	**Modern and Postmodern Age** a. Background, including the World Wars and their impact	**12**	**CO1 CO2 CO3 CO4**	**R U A E**

	b. Philosophical and Scientific changes c. Notable schools of thought and movements d. Notable authors and their works e. Definitions and features			

SuggestedReadings:

1. Hudson, William Henry.(2015).*An Outline History of English Literature*. Rupa Publications.
2. Carter, Ronald. and McRae, John. (2001). *The Routledge History of Literature in English*.Routledge.
3. Long, William J.(2022). *English Literature*.GlobalNet Publication.
4. Choudhury, Bibhas.(2019). *English Social and Cultural History*. PHI Learning Pvt. Ltd.
5. Daiches, David.(2019).*A Critical History of English Literature Volumes I and II*. Supernova.
6. Nayar, Pramod K.(2018). *A Short History of English Literature*. Amity University Press.

R:Remembering, U:Understanding, A1:Applying,A2:Analysing,E:Evaluating,C:Creating

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Dr Hindol Chakraborty Signature:	Name: Mr. Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGMAJ102**
Course Title	**Literary Types & Growth of the Language**
Credits	**4**
Total Hours	**60**
Hours per Week	**4**
Course Type	**Major**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**NA**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course:** a. Provides the development history of English language. b. Gives an overview of different literary types. c. Introduces different figures of speech & literary devices
Prerequisite	Advance English Language Proficiency
Course Objectives	**A student will be able to:** a. Identify the various literary types. b. Associate the factors that have influenced the English language. c. Categorize the growth of English Language. d. Critique literary writings. e. Develop literary projects.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

Cos	Statements	CognitiveLevel Mapping
CO1	Identify the different forms and types of Literary writings.	**R**
CO2	Associate historical, social and regional factors that have influenced English language.	**U**
CO3	Categorize the growth of English language and Literary Forms	**A2**
CO4	Critique different types of literature	**E**

CO5	Develop literary projects	**C**		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Literary Type(Any 2)** a. Prose (PicaresqueNovel,Epistolary Novel, Historical Novel, Bildungsroman, PsychologicalNovel, Novella, ShortStory Features,Evolution of Short Story,Modern Short Stories) b. Poetry (Ballad, Lyric, Ode, Elegy, Sonnet,Verse Romance,BlankVerse,Free Verse,Epic and its types, Epic Conventions, MockEpic) c. Tragedy and Comedy (Tragic Hero, Hamartia, Catharsis, Aristotelian unities, Chorus,Comic Relief,Revenge Tragedy, Domestic Tragedy, Romantic Comedy, Comedy of Humours,Comedy of Manners, Sentimental Comedy)	**30**	**CO1, CO3, CO4, CO5**	**R, U, A1, A2, E,C**
Unit II	**Growth of English language (Any 2)** a. Scandinavian Influence b. French Influence c. Classical Influence	**10**	**CO2, CO3**	**R, U, A1, A2, E,C**
Unit III	**English Language and Regional Influence** a. American and British English(Comparative Study) b. Indian English	**10**	**CO2, CO3**	**R, U, A1, A2, E,C**
Unit IV	**Literary Devices** (Simile, Metaphor, Irony,Dramatic Irony, Bathos, Pathos,Oxymoron,Litotes, Alliteration, Climax, Anticlimax, Synecdoche, Metonymy, Chiasmus, Personification, Anaphora, Transferred epithet, Epigram,Pathetic fallacy, Euphemism)	**10**	**CO4, CO5**	**R, U, A1, A2, E,C**

LearningResources:

Text Books

1. Baugh,A.C., & Cable, Thomas. (2013*).A History of the English Language*. Routledge.
2. Jesperson, O. (2022).*Growth and Structure of English Language.* Atlantic Publishers and Distributors Pvt Ltd.
3. Baldick, C.(2015).*The Oxford Dictionary of Literary terms*. Oxford University Press.
4. Peck, John& Coyle, Martin (2002). *Literary Terms and Criticism*. Macmillan Education.

Suggested readings

1. Gail M. Coelho.(1997).Anglo-IndianEnglish:A Nativized Variety of Indian English. *Language in Society*,*26*(4),561–589.http://www.jstor.org/stable/4168803
2. Hoffmann, S., & Mukherjee, J. (2007). Ditransitive verbs in Indian English and British English:a corpus-linguistic study. *AAA: Arbeiten Aus Anglistik Und Amerikanistik*, *32*(1), 5–24.http://www.jstor.org/stable/43025781

Open online resources

1. Indian English, egyankosh.ac.in(https://egyankosh.ac.in/bitstream/123456789/22565/1/Unit-4.pdf)
2. Global English and Indian English, egyankosh.ac.inhttps://egyankosh.ac.in/bitstream/123456789/26750/1/Unit-2.pdf

Video links

1. Bowern,C.(2015).Where did English come from?.TED-Ed.(https://www.youtube.com/watch?v=YEaSxhcns7Y)
2. A Short History of English Language. The Generalist Papers.(https://www.youtube.com/watch?v=iSSTv8-2358)

Case Study

1. Betageri, A. (2017). A Case for the Standardization of Indian English. *Indian Literature*,*61*(1(297)),171–181.https://www.jstor.org/stable/26791193

2. Assessment

***i. Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

***ii. Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Mr.Pema Gyalchen Tamang Signature:	Mr. Peter Minj Signature:	Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGMAJ103**
Course Title	**Chaucer to Shakespeare**
Credits	**4**
Total Hours	**60**
Hours per Week	**4**
Course Type	**Major**
Semester	**II**
Intended Level	**Certificate**
Issue(s)Addressed	**N/A**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course will:** a. Provide the introduction and insight into major works of 14th to17th century's British literature ranging from Geoffrey Chaucer to William Shakespeare. b. Give a critical understanding of major texts of this era.
Prerequisite	Understand the historical, social, and political context of England and English literature from14th to17th Century.
Course Objectives	**A student will be able to:** a. Identify and differentiate between various literary terms through textual examples. b. Understand and critique the society of the time through the works of Geoffrey Chaucer and Thomas More. c. Analyse and gain critical insight into English poetry through William Shakespeare and other famous poets of the era. d. Examine the dramas of Elizabethan era and gain a preliminary overview of the Elizabethan stage.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student is able to:

Cos	Statements	Cognitive Level Mapping
CO1	Identify and differentiate between various literary terms through textual examples.	**R,U**
CO2	Understand and critique the society of the	**A2,E**

	time through the works of Geoffrey Chaucer and Thomas More.			
CO3	Analyse and gain critical insight into English Poetry through William Shakespeare and other famous poets of the era.	**A2,E**		
CO4	Examine the dramas of Elizabethan era and gain a preliminary overview of the Elizabethan stage.	**A2,E**		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Middle English Prose:** Chaucer: General Prologue, *The Canterbury Tales*-Introduction-Lines 1-31, Prologue to the Wife of Bath	**15**	**CO1 CO2**	**R U A1 A2 E C**
Unit II	**Renaissance Prose:** Thomas More: *Utopia*	**15**	**CO1 CO2**	**R U A1 A2 E C**
Unit III	**Poetry:** a. William Shakespeare: Fair Youth Sonnets: Sonnet 18 (Shall I compare thee to a summer's day?), Dark Lady Sonnets: Sonnet127(In the old age black was not counted fair), b. Sir Philip Sidney: From Astrophel and Stella sonnet sequence: Sonnets 31, 39, 71. c. Edmund Spenser: From Amoretti sonnet sequence: Sonnets LXXV,LXVII,LXVIII d. Sir Thomas Wyatt: *Whoso List to Hunt*	**15**	**CO1 CO3**	**R U A1 A2 E C**
Unit IV	**Drama (Any one text to be taught)** a. Christopher Marlowe's Dr. Faustus b. William Shakespeare's The Twelfth Night c. William Shakespeare's The Merchant of Venice	**15**	**CO1 CO4**	**R U A1 A2 E C**

	d. Thomas Kyd's The Spanish Tragedy			

Learning Resources:

Text Books

1. Chaucer, G.(2003).*The Canterbury Tales*(N.Coghill, Trans.).Penguin. (Original work published 1476).
2. More, T. (2016). *Utopia* (R.M. Adams, Trans.). Cambridge University Press. (Original workpublished1516).
3. Norbrook,D.,& Woudhuysen, H.R.(Eds.).(1993).*The Penguin Book of Renaissance Verse:1509-1659*.(Reprint edition).Penguin Classics.
4. Elam, K., (Ed.).(2013).*Twelfth Night*. Arden Shakespeare.
5. Andrews,R., Smith,R., Wienand,V.,(Eds.).(2014).*The Merchant of Venice*. Cambridge University Press.
6. Mukherjee, S.,(Ed.).(2000).*Doctor Faustus*. Worldview Publications.
7. Edwards, P.,(Ed.).(1977).*The Spanish Tragedy*. Manchester University Press.

Suggested Readings

1. Abrams, M.H.,&Harpham,G.H.(2019).*A Glossary of Literary Terms.*(11th ed.).Cengage.
2. Carter,R.,&McRaeJ.(2017).*The Routledge History of Literature in English.*(3rd ed.). Routledge.
3. Poplawski,P.(2017).*English Literature in Context*.(2nd ed.).Cambridge University Press.
4. Nayar,P.K.(2018).*A Short History of English Literature.* Amity University Press.
5. Boitani,P.,&MannJ. (Eds.).(2004). *The Cambridge Companion to Chaucer*.(2nd ed.). Cambridge University Press.
6. Grazia,M.D.,&WellsS.(2010).*The New Cambridge Companion to Shakespeare*. Cambridge University Press.
7. Ricks, C.,(Ed.).(1970).*English Poetry and Prose,1540-1674*.Barrie&Jenkins.
8. Burch,D.,(Ed.).(2009).*The Oxford Companion to English Literature*.(7th ed.).Oxford University Press.

Open online resources

https://www.thoughtco.com/how-to-identify-a-shakespeare-comedy-

2985155https://www.britannica.com/art/tragedy-literature/Tragedy-and-

modern-dramahttps://www.britannica.com/art/tragicomedy

Video links

NPTELVideoCourse:EnglishLanguageandLiterature**Lecture3-Shakespeare's LifeandTimes**
https://www.digimat.in/nptel/courses/video/109106120/L03.html

NPTEL Video Course: EnglishLanguageandLiterature.**Lecture14: TheAgeof Shakespeare**
http://www.digimat.in/nptel/courses/video/109103020/L14.html

2. Assessment

i. *Formative Assessment*: 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr Peter Minj Signature:	Name: Mr Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGMAJ104**
Course Title	**Indian Literature in English**
Credits	**4**
Lecture Hours	**60**
Hours per Week	**4**
Course Type	**Major Core**
Semester	**II**
Regulation	**2023**
Intended Level	**Certificate**
Issue(s)Addressed	**N/A**
Course Offered to	**English**
Regulation	**2023**
Course Overview:	**This course will:** a. Provide with an overview of Indian writing in English. b. Help the students understand the nature and notions of major Indian authors and their works.
Prerequisite	A student must have previous knowledge of the major papers offered in the first semester that gives the foundation to this course. Basic understanding and appreciating major literary figures of Indian English Literature is needed before taking this course.
Course Objectives:	**A student will be able to:** a. Understand Anglo-Indian writing b. Read and appreciate Indo-Anglian writing. c. Understand the nature of Indian writing in English. d. Appreciate poetry, novels and prose written by various major/minor Indian poets and authors.

Course Content

Units	Contents	Lecture Hours	Cos	RBT	
Unit I	**Overview** a. Macaulay's Minutes, b. Anglo-Indian Writing, c. Indo-Anglian Writing	**5**	**CO1 CO2**	**R,U, E, A, C**	
Unit II	**Poetry** a. Rabindranath Tagore:"Arrival", "The Golden Boat", "The Conch" b. Toru Dutt:"Our Casuarina Tree", "The	**10**	**CO2**	**R,U, E, A, C**	

	Sower" c. A K Ramanujan: "Astronomer" & "A River' d. Dom Moraes: "Absences", "Behind the Door" e. Nissim Ezekiel: "Enterprise", "Night of the Scorpion"				
Unit III	**Essays** a. Jawaharlal Nehru: Selections from *My Autobiography* b. Arundhati Roy: End of Imagination, Selections from *Listening to Grasshoppers* c. Amit Chaudhuri: *On Strangeness in Indian Writing*	**10**	**CO3**	**R,U, E, A, C**	
Unit IV	**Plays** a. Mahesh Dattani: Dance Like a Man/Bravely Fought the Queen b. Girish Karnad: Tughlaq/ Nagamandla c. Manjula Padmanabhan*:* Harvest	**15**	**CO3 CO4**	**R,U, E, A, C**	
Unit V	**Novels** a. R.K.Narayan: Swami and Friends b. Arvind Adiga: The White Tiger c. Sashi Deshpande: The Long Silence/Janice Pariat: Everything the Light Touches	**20**	**CO3 CO4**	**R,U, E, A, C**	

Suggested Readings:

1. 'Commonwealth Literature does not Exist' by Salman Rushdie.
2. *Indian Writing in English*, K.R.Srinivasa Iyengar,Sterling Publications:1984.
3. *A History of Indian English Literature*, M. K.Naik, Sahitya Akademi: 2009.
4. 'Divided by a Common Language', in *The Perishable Empire*, MeenakshiMukherjee,OUP: 2000.
5. 'Introduction' in *Modern Indian Poetry in English*, Bruce King, OUP: 2005.

Course Outcomes(COs)and Cognitive Level Mapping At the end of the course a student will be able to:		
Cos	**Statements**	**RBT**
CO1	Understand Anglo-Indian writing.	**R,U,E,A,C**
CO2	Understand the key aspects of Indo-Anglian writing.	**R,U,E,A,C**
CO3	Understand the nature of Indian writing in English.	**R,U,E,A,C**
CO4	Analyse poetry, novels and prose written by various major/minor Indian poets and authors.	**R,U,E,A,C**

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Faculty Member (Course prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name:Mr Peter Lepcha Signature:	Name: Mr.Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGMIN101**
Course Title	**Selections from Indian Literature**
Credits	**4**
Total Hours	**60**
Hours per Week	**4**
Course Type	**Minor**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**N/A**
Course Offered to	**Other than English**
Regulation	**2023**
Course Overview	**This course will:** a. Provide with an overview of Indian writing in English. b. Help the students understand the nature and notions of major Indian authors and their works.
Prerequisite	Understanding and appreciating major literary figures and their works of Indian English Literature.
Course Objectives	**A student will be able to:** a. Understand the nature of Indian writing in English. b. Appreciate poetry, novels, prose and short stories written by various major/minor Indian poets and authors. c. To evaluate critically the contributions of major Indian English poets and dramatists.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Read and gain an overview of Indian writing.	**R**
CO2	Appreciate poetry, novels, prose and short-stories written by various major/minor Indian Poets and authors	**U**
CO3	Analyse India writing in context	**A1**
CO4	Analyse situations in real life by gaining an understanding of these texts.	**A2**
CO5	Evaluate critically the contributions of major Indian English poets and dramatists	**E**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Poetry** a. Rabindranath Tagore: “Arrival”, “The Golden Boat”, “The Conch” b. Sarojini Naidu: “Palanquin Bearers”, “Autumn Song”	**10**	**CO1 CO2 CO3**	**R U A2 E**
Unit II	**Novels(fiction)** a. Anita Desai: Fasting Feasting b. Ruskin Bond: The Room on the Roof	**20**	**CO1 CO2**	**R U A2**
Unit III	**Plays** a. Mahesh Dattani: Dance Like a Man b. Girish Karnad: Hayavadana	**15**	**CO1 CO2 CO3**	**R U A2 E**
Unit IV	**Short Stories** a. Rabindranath Tagore: "The Postmaster" b. Khushwant Singh: "The Portrait of a Lady"	**15**	**CO1 CO2**	**R U A2**

Learning Resources:(Latest edition books listed in APA style: Seventh Edition)

Text books

1. Tagore,R.(2005).*Selected Poems*(W.Radice,Trans.).PenguinClassics.
2. Desai,A.(2000).*Fasting Feasting*.Vintage
3. Bond,R.(2008).*The Room on the Roof*. Penguin Books Limited.
4. Dattni,M.(2006). *Dance Like A Man.*Penguin India.
5. Karnad, G.(1997).*Hayavadana.* Oxford.
6. Tagore,R. (2000).*The Postmaster:Selected Stories.*Penguin Modern Classics.
7. Singh, K.(2009).*The Portrait of a Lady: Collected Stories.* Penguin Books India.

Suggested readings

1. Mehrotra,AK.(2017).A Concise History of Indian Literature in English. The Orient Blackswan.
2. Naik, M.K.(2019).A History of Indian English Literature.Sahitya Akademi.
3. Iyenger,KRS, andNandakumar,P.(2013).Introduction to the Study of English Literature. Sterling Publications Pvt Ltd.
4. Rao, A.R.(1992).Comparative Perspectives on Indian Literature. NewDelhi: Prestige Books.

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: MsRinchen Sherpa Signature:	Name: Mr Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGMIN102**
Course Title	**Selections from British Literature**
Credits	**4**
Total Hours	**60**
Hours per Week	**4**
Course Type	**Minor**
Semester	**II**
Intended Level	**Certificate**
Issue(s)Addressed	**N/A**
Course Offered to	**Other than English**
Regulation	**2023**
Course Overview	**This course will:** a. Offer a broad introduction to British Literature and to the distinctive characteristics of texts and the literary techniques employed by them. b. Cover major works of fiction, non-fiction, poetry, and drama. c. Introduce students to the historical context, author's influence, and literary impact of the works.
Prerequisite	Students must have a proficiency in English Language and an interest in English literature.
Course Objectives	**Students will be able to:** a. Critically analyze British literary texts across genres and times. b. Identify key ideas and characteristic perspectives or attitudes as expressed in British Literature c. Compare/contrast literary works through an analysis of genre, theme, character, and other literary devices**.**

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive LevelMapping
CO1	Identify key ideas and characteristic perspectives or attitudes as expressed in literary texts.	**R**
CO2	Explain concepts and theories expressed in the texts.	**U**

CO3	Relate literary works through a comparison and contrast of genre, theme, character, and other literary devices**.**	**A1**
CO4	Analyse literary works through an analysis of genre, theme, character, and other literary devices.	**A2**
CO5	Evaluate British literary texts across genres and times.	**E**
CO6	Develop critical thinking skills along with writing and reading skills.	**C**

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Poetry:1** WilliamShakespeare:Sonnets18,65, 128.	**10**	**CO1 CO2 CO4 CO5 CO6**	**R U A1 A2 E C**
Unit II	**Poetry:2** a. John Keats: Ode to Autumn b. William Blake: The Chimney Sweeper c. Robert Browning: The Last Duchess	**15**	**CO1 CO2 CO4 CO5 CO6**	**R U A1 A2 E C**
Unit III	**Short Stories:** a. Virginia Woolf: The Duchess and the Jeweller. b. George Orwell: Shooting an Elephant c. H.G.Wells: The Magic Shop	**15**	**CO1 CO2 CO3 CO4 CO6**	**R U A1 A2 E C**
Unit IV	**Drama:** G.B.Shaw: Arms and the Man	**20**	**CO1 CO2 CO4 CO6**	**R U A1 A2 E C**

Suggested Readings:

1. Ahlawatetal, Menka (2019). *Selections from British Literature: Poems and Short Stories*. Worldview.
2. Jack, Ian(1973)*Browning's Major Poetry.* Clarendon Press: Oxford.
3. Abrams, M. H. (ed) (1975). *English Romantic Poets: Modern Essays in Criticism.* Oxford University Press.
4. Ford, Boris (ed)(1957).*From Blaketo Byron. The Pelican Guide to English Literature. Vol 5.*

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).
Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Ms.Pratibha Soni Signature:	Name: Mr Peter Minj Signature:	Name:Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGSEC101**
Course Title	**English Phonetics, Phonology and Variants of English**
Credits	**3**
Total Hours	**45**
Hours per Week	**2**
Course Type	**Skill Enhancement Course**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**NA**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamental understanding of English Phonetics. b. Aims at providing knowledge of Vowels, Consonants and Consonant Clusters. c. Enhances the skill of learning proper accents.
Prerequisite	Basic knowledge of spoken English
Course Objectives	**A student will be able to:** a. Have a thorough understanding of Phonetics and Phonology. b. Know the syllable and Word Accent. c. Enhance skills of English pronunciation and speech mechanism.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understanding English Phonetics and Phonology	**R,U**
CO2	Analyse and remember the syllable and word accent.	**R,A2**
CO3	Apply proper English pronunciation and speech mechanism	**C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Linguistics and Phonetics** a. Phonetics and Phonology b. Syllable c. Word Accent	**20**	**CO1 CO2 CO3**	**R U A1 A2 E C**
Unit II	**Pronunciation** a. Speech Mechanism b. The Speech Organs c. Vowels and Consonants-Consonant Cluster in English.	**10**	**CO1 CO2 CO3**	**R U A1 A2 E C**
UnitIII	**Variants of English** a. British English (RP) b. American English c. Indian English	**15**	**CO1 CO2 CO3**	**R U A1 A2 E C**
Learning Resources: 1. An Introduction to the pronunciation of English: A.C.Gimson. 2. A text Book of English Phonetics for Indian Students:T.Balasubramanium(Macmillan)				

R:Remembering,U:Understanding,A1:Applying,A2:Analysing,E:Evaluating,C:Creating

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).

Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty	Head of the Department	Dean
Name:Dr Terence Mukhia Signature:	Name:Ms Ashwini Tamang Signature:	Name: Signature:

1. Course Description

Course Code	**23ENGSEC102**
Course Title	**Aspects of Editing**
Credits	**3**
Total Hours	**45**
Hours per Week	**2**
Course Type	**Skill Enhancement Course**
Semester	**II**
Intended Level	**Certificate**
Issue(s)Addressed	**Editing, Research, Publication**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamental understanding of Editing. b. Aims at basic aspects needed for research. c. Focuses on how to write a research paper.
Prerequisite	Basic knowledge of reading journals, articles and newspapers.
Course Objectives	**A student will be able to:** a. Have a thorough understanding of Proofreading. b. Develop their skills in editing. c. Enhance their ability in copyediting.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understanding basics of proofreading and copyediting	**R,U**
CO2	Apply the knowledge of editing and proofreading in writing projects.	**R,A2**
CO3	Edit different scripts and documents.	**C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Introduction to Copy Editing** a. What is copyediting? b. Typescripts corrected by the author. c. Copy editing on screen	**20**	**CO1 CO2 CO3**	**R U A1 A2 E C**
Unit II	**Proof Reading** a. Fundamentals of proofreading b. Reading proofs a. Making corrections	**25**	**CO1 CO2 CO3**	**R U A1 A2 E C**
Learning Resources: 1. Strunk,William.Jr.andWhite,E.B. *The Elements of Style* 2. Gross,Gerald. *Editors on Editing*,NewYork:Grove,1993				

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).
Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty	Head of the Department	Dean
Name:Ms Shenaz Naznin Signature:	Name: Mr Peter Minj Signature:	Name: Signature:

1. Course Description

Course Code	**23AECE101**
Course Title	**Compulsory English**
Credits	**2**
Total Hours	**30**
Hours per Week	**1**
Course Type	**Ability Enhancement course**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**Comprehension, Writing**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamental understanding of formal-writing based communication. b. Aims at basic aspects needed for coherent and well-structured paragraphs. c. Focuses on how to write concisely and effectively.
Prerequisite	Basic knowledge of reading journals, articles and newspapers.
Course Objectives	**A student will be able to:** a. Gain basic understanding of formal writing-based communication. b. Develop their skills in essay/formal writing. c. Enhance their writing skills.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

Cos	Statements	Cognitive Level Mapping
CO1	Understand basics of formal-writing based communication	**R,U**
CO2	Develop skills in essay/formal writing .	**R,A2**
CO3	Enhance their writing skills	**C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Comprehension& Summary** a) Comprehension b) Essay Writing c) Summary Writing	**15**	**CO1** **CO2**	**R** **U** **A1** **A2** **E** **C**
Unit II	**Writing** a. Formal and informal Letter Writing b. Notice Writing c. Resume Writing	**15**	**CO2** **CO3**	**R** **U** **A1** **A2** **E** **C**
Learning Resources: 1. Bly, R W. (2004)*Webster's New World Letter Writing Handbook*. Wiley Publishing House. 2. Kumar, S, & Pushp, L. (2018) *Communication Skills: A Workbook*. OUP.				

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).
Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty	Head of the Department	Dean
Name:MrAnikSarkar Signature:	Name: Mr Peter Minj Signature:	Name:Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23AECE102**
Course Title	**Alternative English**
Credits	**2**
Total Hours	**30**
Hours per Week	**1**
Course Type	**Ability Enhancement course**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**Composition, Editing, Corrections**
Course Offered to	**English**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamentals of constructing passages. b. Focuses on how to write effectively. c. Provides fundamental understanding of Proofreading & editing. d. Aims at basic aspects needed for error corrections
Prerequisite	Basic knowledge of English Grammar.
Course Objectives	**A student will be able to:** a. Gain a thorough understanding of Proofreading. b. Develop their skills in academic editing.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

Cos	Statements	Cognitive Level Mapping
CO1	Understanding basic knowledge of Comprehending literary texts.	**R,U**
CO2	Understand the basic aspects of academic writing. .	**R,A2**
CO3	Applying the knowledge of editing and proofreading	**C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Comprehension& Summary** a) Comprehension b) Summary Writing c) Academic Writing	**15**	**CO1** **CO2**	**R** **U** **A1** **A2** **E** **C**
Unit II	**Editing** a. Stylesheet Practice b. Proofreading	**15**	**CO2** **CO3**	**R** **U** **A1** **A2** **E** **C**
Learning Resources: 1. Critchley, W.(2007).*The Pocket Book of Proofreading*: *A Guide to Freelance Proofreading &Copy-Editing*. First English Books. 2. Bailey, S.(2018).*Academic Writing: A Handbook for International Students* (5th ed.). Routledge.				

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).

Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty	Head of the Department	Dean
Name: Mr Anik Sarkar Signature:	Name: Mr Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGMDC101**
Course Title	**Business English**
Credits	**3**
Total Hours	**45**
Hours per Week	**3**
Course Type	**Multi-Disciplinary Course**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**Compositions, Fundamental Grammar, Official Writings**
Course Offered to	**Education**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamental skill enhancement related to English fundamental communication. b. Focuses on Basic English grammar. c. Builds composition skills in the students.
Prerequisite	Understanding and writing business communication in proper and Formal ways.
Course Objectives	**A student will be able to:** a. To enhance the comprehension, reading, writing and speaking skills of the students. b. Provide with a thorough understanding of Basic English grammar and construction. c. Help the students write business communication in proper and official formats.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand basic English grammar and sentence construction.	**R,U**
CO2	Write business communication in proper and official formats.	**A1,A2,C**
CO3	Enhance the comprehension, reading, writing and speaking skills of the students.	**U,C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Grammar and Vocabulary** a. Articles b. Preposition c. Use of Tenses d. Synonyms and Antonyms	**15**	**CO1 CO3**	**R U A1 A2 E C**
Unit II	**Writing Skills** a. Write a business letter on the given subject b. Précis Writing c. Minute Keeping	**30**	**CO2 CO3**	**R U A1 A2 E C**
Learning Resources: 1. *Applied English Grammar and Composition*, Dr.P.C.Das, New Central Book Agency: 2012. 2. *Creative Writing: A Beginner's Manual,* Anjana Neira Dev, Pearson Education India, 2008. *3. On Track: English Skills For Success ,Board of Editors,* Solapur University, 2013				

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).

Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty	Head of the Department	Dean
Name: Ms Ashwini Tamang Signature:	Name: Mr Peter Minj Signature:	Name: Signature:

1. Course Description

Course Code	**23ENGMDC102**
Course Title	**Writing and Reading Skills**
Credits	**3**
Total Hours	**45**
Hours per Week	**3**
Course Type	**Multi-Disciplinary Course**
Semester	**II**
Intended Level	**Certificate**
Issue(s)Addressed	**Compositions, Fundamental Grammar, Official Writings**
Course Offered to	**Other than English Department**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamental skill enhancement related to English fundamental communication. b. Focuses on Basic English grammar. c. Builds compositional skills in the students.
Prerequisite	Understanding and writing creative things important for research.
Course Objectives	**A student will be able to:** a. To enhance the comprehension, reading, writing and speaking skills. b. To provide with a thorough understanding of comprehension, summary and essay writings. c. To enhance the skills of the students through the exercise in Language and Literature.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand basic English grammar and sentence construction.	**R,U**
CO2	Write business communication in proper and official formats.	**A1,A2,C**
CO3	Enhance the comprehension, reading, writing and speaking skills of the students.	**U,C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Writing Skills** a. Summary writing b. Essay writing c. Notice Writing d. Letter Writing e. Paragraph Writing	**20**	**CO1 CO2 CO3**	**R U A1 A2 E C**
Unit II	**Reading Skills** a. Reading, Paraphrasing b. Analysis c. Interpretation of Literary Text	**25**	**CO1 CO2 CO3**	**R U A1 A2 E C**
Learning Resources: 1. Dr.P.C.Das, P.C.(2012).*Applied English Grammar and Composition*. New Central Book Agency. *2.* NeiraDev, Anjana.(2008). *Creative Writing: A Beginner's Manual.* Pearson Education India.				

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT – (30 Marks).

Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Course Prepared by)	**Head of the Department (Checked and Verified by)**	**Dean (Approved by)**
Name: Mr Deepraj Rai Signature: 	Name: Mr Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23SCSVAC1**
Course Title	**Theatre and Theatrics**
Credits	**1**
Total Hours	**30**
Hours per Week	**2**
Course Type	**Value Added Course**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	
Course Offered to	**English and Others**
Regulation	**2023**
Course Overview	**This course:** a. Provides fundamental theories of dramatic performances. b. Aims at using body as an instrument. c. Focuses of stress releasing and purgation through acting.
Prerequisite	N/A
Course Objectives	**A student will be able to:** a. Understand the basics of play-making in both theory and practice. b. Train their bodies and voice for effective communication. c. Train their pitch and memory.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand the basics of play-making in both theory and practice.	**R,U,A1,C**
CO2	Train their bodies and voice for effective communication.	**R,A1,A2,C**
CO3	Train their pitch and memory.	**R,C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Types of play** a. Tragedy b. Comedy c. Tragicomedy d. Melodrama e. Theatre of the Absurd f. The theory of Rasa	**10**	**CO1**	**R** **U** **A1** **A2** **E** **C**
Unit II	**Practice** a. Breathing exercises b. Voice exercises c. Body exercises d. Movement training onstage e. Intonation and Recall exercises	**20**	**CO2** **CO3**	**R** **U** **A1** **A2** **E** **C**
Learning Resources: 1. Aristotle(1996).*Poetics*.Penguin Classics. 2. Barnet,Sylvan,Burto,William,Ferris,LesleyandRabkin,Gerald(2001).*Types of Drama :Plays and Contexts*. Pearson 3. *NatyaSastra of Bharatamuni: Translated into English by a Board of Scholars*(2014). Sri Satguru Publications.				

2. Assessment

i. ***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

ii. *Summative Assessment*: 50 marks

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks).

Summative Assessment Time: 2 Hours for pen and paper test.

Course Faculty (Course Prepared by)	**HoD (Checked and Verified by)**	**Dean (Approved by)**
Name: Mr Vasudeva Naidu Signature:	Name: Mr Peter Minj Signature:	Name:Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGVAC101**
Course Title	**Remedial Grammar**
Credits	**1**
Total Hours	**15**
Hours per Week	**1**
Course Type	**Value Added Course**
Semester	**I**
Intended Level	**Certificate**
Issue(s)Addressed	**English Grammar**
Course Offered to	**English and Others**
Regulation	**2023**
Course Overview	**This course:** a. To enhance the comprehension, reading, writing and speaking skills of the students. b. Provide with a thorough understanding of Basic English grammar and construction. c. To introduce corrective measure to the students.
Prerequisite	N/A
Course Objectives	**A student will be able to:** a. Understand basic English grammar and sentence construction. b. Eradicate grammatical errors in speech and writing c. Enable the students to acquire the writing skills.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand basic English grammar and sentence construction.	**R,U,A1,C**
CO2	Eradicate grammatical errors in speech and writing .	**R,A1,A2,C**
CO3	Enable the students to acquire writing skills.	**R,C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Remedial Grammar** 1.Nouns; Pronouns 2.Articles 3.Verb and adverb 4.Uses of Tenses 5.Prepositions	**10**	**CO1, CO2**	**R U A1 A2 E C**
Unit II	1.Letter writing 2.Report writing 3.Notice writing 4.Paragraph writing	**5**	**CO3**	**R U A1 A2 E C**
Learning Resources: 1. Wood, F. T. (1968) *A Remedial English Grammar for Foreign Students.* Macmillan				

2. Assessment

***i. Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

***ii. Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)
b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test.

Course Faculty (Course Prepared by)	**HoD (Checked and Verified by)**	**Dean (Approved by)**
Name: Ashwini Tamang Signature:	Name: Mr Peter Minj Signature:	Name: Mr Ravi Bhushan Singh Signature:

1. Course Description

Course Code	**23ENGVAC102**
Course Title	**Writing Skills**
Credits	**1**
Total Hours	**15**
Hours per Week	**1**
Course Type	**Value Added Course**
Semester	**II**
Intended Level	**Certificate**
Issue(s)Addressed	**English Grammar**
Course Offered to	**English and Others**
Regulation	**2023**
Course Overview	**This course:** 1. To enhance the comprehension, reading, writing and speaking skills of the students. 2. Provide with a thorough understanding of Basic English grammar and construction. 3. Help the students with communication.
Prerequisite	N/A
Course Objectives	**A student will be able to:** 1. Understand the figurative aspect of the language. 2. Enhance the comprehension, reading and writing skills of the students. 3. Enable the students to acquire the writing skills.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Understand the figurative aspect of the language	**R,U,A1,C**
CO2	Enhance the comprehension, reading and writing skills of the students.	**R,A1,A2,C**
CO3	Enable the students to acquire the writing skills.	**R,C**

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	1.Comprehension (Poetry & Prose)	**6**	**CO1, CO2**	**R U A1 A2 E C**
Unit II	1. Figures of speech: a. Simile b. Metaphor c. Oxymoron d. Personification	**9**	**CO3**	**R U A1 A2 E C**
Learning Resources: 1. Wood, F. T. (1968) *A Remedial English Grammar for Foreign Students.* Macmillan				

2. Assessment

***Formative Assessment*: 50 marks** as per Assessment & Evaluation Framework Document of Salesian College

***Summative Assessment*: 50 marks**

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT –(30 Marks). Summative Assessment Time: 2 Hours for pen and paper test.

Course Faculty (Course Prepared by)	**HoD Checked and Verified by)**	**Dean (Approved by)**
NameMs Ashwini Tamang Signature:	Name: Mr Peter Minj Signature:	Name:Mr Ravi Bhushan Singh Signature:

COURSES PROPOSED TO BE TAUGHT FROM SEMESTER 3 to SEMESTER 8

Semester 3

Major
MC 5: British Literature: 17th Century & 18th Century
MC 6: Genre Literature (Any one: Popular Fiction/Science Fiction/Thriller/Romance/Horror)

Minor
MN 3: Genre Fiction I (Popular Fiction)

Semester 4

Major
MC 7: British Literature: Pre-Romantics &Romantics
MC 8: American Literature
MC 9: British Literature: Victorian Literature

Minor
MN 4: Genre Fiction II (Science Fiction)

Semester 5

Major
MC 10: Modern and Post-Modern Literature
MC 11: Literature & Marginality (Disability, Queer, Dalit)
MC12: Literature & Science (Any two: Plant Studies / Zoological Studies / Chemistry& Literature / Technology & Literature)

Minor
MN 5: American Literature

Semester 6

Major
MC 13: European & South Asian Classical Literature
MC 14: Postcolonial Literature

MC 15: Literary Theory & Criticism I

Minor
MN 6: Contemporary British Literature (21st Century)

4th Year with Research Semester 7

MC 16: Research Methodology
MC 17: Himalayan Literature
MC 18: Posthumanism & Anthropocene

4th Year with Research Semester 8

Major
MC 19: Translation Studies
MC 20: Dissertation (12 Credits)

4th Year without Research Semester 7

MC 16: Himalayan Literature
MC 17: Posthumanism & Anthropocene
MC 18: Translation Studies
MC 19: Diaspora Literature

4th Year without Research Semester 8

MC 20: Art History; Aesthetics & Literature
MC 21: Women's Writings
MC 22: Cinema & Literature
MC 23: Literary Theory & Criticism II

Salesian College, Siliguri
(Autonomous)

National Education Policy (NEP) 2020 Curriculum Framework

For

Bachelor of Science in Physics

Offered by the

Department of Physics
Deanery of Sciences
Salesian College (Autonomous), Siliguri

NAAC Accredited A Grade (3rd cycle) and twice UGC certified College with Potential for Excellence (CPE)

Affiliated to the University of North Bengal
Siliguri - 734001
West Bengal

Vision

The vision of the Department of Physics is to build the rudiments for excellence and motivate the students to discover their latent talents through theoretical and practical physics and apply them to contribute to the betterment of self and of society and the nation at large.

Mission

The mission of the Department of Physics is to strive to attain high standards of excellence in generating and propagating knowledge in physics. The faculty members are committed to providing education that combines rigorous academics with the joy of discovery through nurturing a vibrant academic ambience conducive to study, creation, and dissemination of knowledge.

Exit Options:

Qualification	Exit Stage
Certificate in Physics	After successful completion of semesters I and II with 44 credits
Diploma in Physics	After successful completion of semesters I to IV with 86 credits
B.Sc. in Physics	After successful completion of semesters I to VI with 126 credits
B.Sc. (Hons.) in Physics	After successful completion of semesters I to VIII with 168 credits
B.Sc. (Hons. with Research) in Physics	After successful completion of semesters I to VIII with 168 credits, including 12 research credits

Program Objectives

Certificate in Physics

The Certificate course in Physics aims to provide

1. A comprehensive overview of introductory physics, mathematics and computation required to model and analyse elementary physical phenomena.
2. Development of analytical skills and competence in applying simple physical concepts to real life phenomena.
3. Encouragement and development of general critical and analytical thinking, scientific reasoning, problem-solving skills, written and verbal communication skills, and teamwork.
4. Self-conception with regard to moral and ethical awareness, leadership qualities, innovative ideas and life-long learning, and an appreciation for multicultural competence and multilingualism.
5. An ability to improve the knowledge and skills required to pursue higher levels of education or a career in the sciences.

Diploma in Physics

The Diploma course in Physics aims to provide

1. A comprehensive overview of the major areas of physics, mathematics and computation required to model and analyse general physical phenomena.
2. Development of analytical skills and competence in applying common physical concepts to real life phenomena.
3. Encouragement and development of general critical and analytical thinking, scientific reasoning, problem-solving skills, written and verbal communication skills, and teamwork.
4. Self-conception with regard to moral and ethical awareness, leadership qualities, innovative ideas and life-long learning, and an appreciation for multicultural competence and multilingualism.
5. An ability to improve the knowledge and skills required to pursue higher levels of education or a career in the sciences.

B. Sc. in Physics

The Bachelors course in Physics aims to provide

1. A comprehensive and detailed overview of all primary fields of physics, with the mathematical and computational background required to model and analyse most physical phenomena.
2. Development of analytical skills and competence in applying both common and abstract physical concepts to real life phenomena.
3. Encouragement and development of general critical and analytical thinking, scientific reasoning, problem-solving skills, written and verbal communication skills, and teamwork.
4. Self-conception with regard to moral and ethical awareness, leadership qualities, innovative ideas and life-long learning, and an appreciation for multicultural competence and multilingualism.
5. Sufficient knowledge to be able to participate in graduate and career entrance examinations such as IIT-JAM, CUET (PG), UPSC-CSE etc.

6. An ability to improve the knowledge and skills required to pursue higher levels of education or a career in the sciences.

B. Sc. (Hons./Hons. with Research) in Physics

The Bachelors (Hons./Hons. with Research) course in Physics aims to provide

1. A comprehensive and detailed overview of all primary fields of physics, with the mathematical and computational background required to model and analyse most physical phenomena.
2. A comprehensive and detailed overview of important advanced fields of physics.
3. Development of analytical skills and competence in recognizing and applying any pertinent physical concept to real life phenomena.
4. Encouragement and development of general critical and analytical thinking, scientific reasoning, problem-solving skills, written and verbal communication skills, and teamwork.
5. Self-conception with regard to moral and ethical awareness, leadership qualities, innovative ideas and life-long learning, and an appreciation for multicultural competence and multilingualism.
6. Sufficient knowledge to be able to participate in graduate/post-graduate and career entrance examinations such as IIT-JAM, CUET (PG), JEST, GATE, UPSC-CSE etc.
7. An ability to improve the knowledge and skills required to pursue higher levels of education or a career in the sciences.
8. Exposure to the latest advancements of physics, research and allied fields.

Program Outcomes

The learning outcomes of the undergraduate degree course in physics are

a) *Knowledgeable and Technically Capable*:
The graduate has the ability to apply the knowledge of basic science principles in the solution of complex problems of scientific and technical interest.

b) *Problem Solver*:
The graduate has the ability to identify, formulate and analyse complex scientific problems and reach substantiated conclusions using first principles of mathematical, computational and natural sciences.

c) *Innovative Thinker*:
The graduate has the ability to create, select and apply suitable techniques, resources and the use of modern analytical and scientific tools to identify, formulate and solve problems pertaining to applied science.

d) *Modern Tools Oriented*:
The graduate has the ability to apply appropriate techniques and resources of modern technology and computational tools for prediction and modelling of science problems.

e) *Scientifically Tempered*:
The graduate has the ability to develop a scientific temper and inquisitiveness for further studies, research and the promotion of scientific thinking.

f) *Effective Communicator*:
The graduate has the ability to communicate scientific and technical information in oral, written and graphical form to both science and lay audience.

g) *Group Worker*:
The graduate has the ability to work as a member and a leader in any team, and to manage projects and work in a multidisciplinary environment.

h) *Global Citizen*:
The graduate has an understanding of their professional, social and ethical responsibilities for a better society.

i) *Life-Long Learner*:
The graduate has the ability to recognize the need and importance of engaging in life-long learning.

Assessment

The Formative and Summative Assessments are to be evaluated as per the Assessment & Evaluation Policy Manual of Salesian College. For each course, the Board of Studies has provided a recommended, non-binding schema for assessment.

Proposed Courses offered by the Department of Physics
4 Year Bachelors Course

Semester	Paper Code	Paper	Credits (Theory)	Credits (Lab)	Teaching Hours
I	23PHYMAJ101	Calculus and Vector Analysis	4	0	4
	23PHYMAJ102	Mechanics and Properties of Matter	3	1	3 + 2
	23PHYSEC101	Introduction to Computers & Programming	0	3	6
	23PHYMDC101	Astronomy and Cosmology for the Curious	3	0	3
	23PHYVAC101	Quantum Crossroads I		1	2
		Total	**15**		**20**
II	23PHYMAJ103	Electricity and Magnetism	3	1	3 + 2
	23PHYMAJ104	Waves and Optics	3	1	3 + 2
	23PHYSEC102	Practical Electricity	2	1	2 + 2
	23PHYMDC102	Quantum Physics for the Curious	3	0	3
	23PHYMIN102	Mechanics	3	1	3 + 2
	23PHYVAC102	Quantum Crossroads II		1	2
		Total	**19**		**24**
III	23PHYMAJ201	Differential Eqns and Complex Analysis	4	0	4
	23PHYMAJ202	Digital Electronics	3	1	3+2
	23PHYSEC201	Numerical Methods using Computation	0	3	6
	23PHYMDC201	Physics of Sports	3	0	3
	23PHYVAC201	Quantum Crossroads III		1	2
		Total	**15**		**20**
IV	23PHYMAJ203	Thermal Physics	3	1	3 + 2
	23PHYMAJ204	Relativity and Modern Physics	3	1	3 + 2

	23PHYMAJ205	Analog Electronics	3	1	3 + 2
	23PHYMIN202	Electricity and Magnetism	3	1	3 + 2
	23PHYVAC202	Quantum Crossroads IV		1	2
		Total	**17**		**22**
V	23PHYMAJ301	Solid State Physics	3	1	3 + 2
	23PHYMAJ302	Analytical Mechanics	3	1	3 + 2
	23PHYMAJ303	Quantum Mechanics	3	1	3 + 2
	23PHYVAC301	Quantum Crossroads V		1	2
		Total	**13**		**17**
VI	23PHYMAJ304	Statistical Mechanics	3	1	3 + 2
	23PHYMAJ305	Atomic and Molecular Physics	3	1	3 + 2
	23PHYMAJ306	Elective I	4	0	4
	23PHYMIN302	Electronics	3	1	3 + 2
		Total	**16**		**19**
VII	23PHYMAJ401	Nuclear and Particle Physics	4	0	4
	23PHYMAJ402	Statistics and Research Methodology	3	1	3 + 2
	23PHYMAJ403	Advanced Mathematical Physics	4	0	4
	23PHYMAJ404 OR 23PHYMAJ405	Elective II Research	4 4	0	4 4
		Total	**16**		**17**
VIII	23PHYMAJ406	Advanced Electrodynamics	3	1	3 + 2
	23PHYMAJ407	Elective III	4	0	4
	23PHYMAJ408 23PHYMAJ409 OR 23PHYMAJ410	Introduction to Nanophysics Elective IV Research	4 4 8	0 0	4 4 8

	23PHYMIN402	Waves and Optics	3	1	3 + 2
		Total	**20**		**22**
		Grand Total	**131**		**161**

LIST OF ELECTIVES

Elective I	Elective II	Elective III	Elective IV
Physical Acoustics and Applications	Astronomy and Astrophysics	Advanced Quantum Mechanics	Advanced Solid State Physics
Magnetism in Materials	Nonlinear Dynamics and Chaos Theory	Physics of Radiation	Lasers and Advanced Optics

1. Programme Matrix of Courses offered by the Department of Physics (1st Year)

Semester	Course Code	Course Type	Title of the Course	Credit	Lecture Tutorial Practical (L+T+P)	Total Hours	Total Marks
I	23PHYMAJ101	Major	Calculus and Vector Analysis	4	3+1+0	60	100
	23PHYMAJ102	Major	Mechanics and Properties of Matter	4	3+0+1	75	100
	23PHYSEC101	SEC	Introduction to Computers & Programming	3	0+0+3	90	100
	23PHYMDC101	MDC	Astronomy and Cosmology for the Curious	3	3+0+0	45	100
	23PHYVAC101	VAC	Quantum Crossroads I	1	0+0+1	30	50
	Total			**15**		**300**	
II	23PHYMAJ103	Major	Electricity and Magnetism	4	3+0+1	75	100
	23PHYMAJ104	Major	Waves and Optics	4	3+0+1	75	100
	23PHYMIN102	Minor	Mechanics	4	3+0+1	75	100
	23PHYSEC102	SEC	Practical Electricity	3	2+0+1	60	100
	23PHYMDC102	MDC	Quantum Physics for the Curious	3	3+0+0	45	100
	23PHYVAC102	VAC	Quantum	1	0+0+1	30	50

			Crossroads II				
	Total			**19**		**360**	

Students' Progression Mapping			
RBT - Cognitive Level Mapping		**Dave's Psychomotor Mapping**	
Symbols	**Meaning**	**Symbols**	**Meaning**
R	Remembering	I	Imitation
U	Understanding	M	Manipulation
A1	Applying	P	Precision
A2	Analysing	A	Articulation
E	Evaluating	N	Naturalization
C	Creating		

Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYMAJ101 - Calculus and Vector Analysis

1. Course Description

Course Code	23PHYMAJ101
Course Title	Calculus and Vector Analysis
Credits	4
Total Hours	60
Hours per Week	4
Course Type	Major
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. Aims to recapitulate basic understanding of calculus. b. Helps to explore the application of calculus in physics based problems. c. Helps to understand and apply the concept of vectors. d. Teaches the basic operations of vectors.
Prerequisite	Student must have introductory knowledge of limits, derivatives, integrals (definite and indefinite), partial fractions, and vectors
Course Objectives	A student will be able to: i. Develop skills in finding derivatives of functions and applying them to solve problems related to rates of change, optimization, etc. ii. Develop skills in solving definite and indefinite integrals and applying them to cases involving areas, volumes, and accumulation. iii. Understand the basic properties of vectors and their manipulation using addition, subtraction, scalar multiplication, and dot & cross products. iv. Understand vector equations and their applications in solving problems related to lines, planes, and curves. v. Introduce the concepts of vector differentiation and integration and their applications.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Describe the concepts of integral and differential calculus in relation to the various physical and mathematical contexts.	R
CO2	Explain the importance of vector quantities in physics-based problems and restate the operation of vector quantities.	U

CO3	Classify and solve different kinds of derivatives, such as total, partial, exact and inexact derivatives, and apply them to physics-based problems.	A1		
CO4	Analyze the concept and properties of special functions such as Gamma function, Beta function, Dirac Delta function, etc., and apply them to solve numerical problems of physical interest.	A2		
CO5	Evaluate the different orthogonal coordinate systems and select the appropriate mutual and operator transformations.	E		
CO6	Construct solutions for real-life physics-based problems using vector differentiation & vector integration.	C		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Single Variable Calculus** Functions of a single variable: plotting functions, tangent to the curve; continuity; instantaneous and average quantities; the derivative; chain rule; higher order derivatives; implicit differentiation; mean value theorem; maxima and minima; approximations using Taylor and binomial theorems Indefinite integrals; integrals by substitution; integration by parts; definite integrals; area under curves; first and second fundamental theorems of calculus; special techniques of integration: trigonometric substitution, partial fractions, completing the square, polar coordinates etc. The Gaussian integral; the Dirac delta function: representation as a limit of Gaussian and rectangular functions; basic properties Beta and Gamma functions and their properties; relation between beta and gamma functions; reduction of integrals to Gamma functions; the error function	**15**	**1, 4**	**R U A1 A2 E C**
Unit II	**Vector Algebra** Review of scalars and vectors; properties of vectors under rotations; scalar product and its	**5**	**2**	**R U A1 A2**

	invariance under rotation; vector product and interpretation as area; scalar triple product and interpretation as volume; vector triple product			**E C**
Unit III	**Multivariable Calculus** Orthogonal coordinate systems: Cartesian, spherical polar, and cylindrical polar coordinates, conversions between coordinate systems Partial derivatives and total derivatives; exact and inexact differentials; chain rule for partial derivatives; directional derivatives and the gradient; constrained maximization using Lagrange multipliers	**8**	**3, 5**	**R U A1 A2 E C**
Unit IV	**Vector Differentiation** Curves, surfaces, scalar and vector fields; time derivatives of a vector function Directional and normal derivatives; gradient of a scalar field and its geometric interpretation; divergence and curl of a vector field; the Laplacian operator; product rules and second derivatives of the del operator; gradient, divergence, curl and Laplacian in Cartesian, spherical and cylindrical coordinates (with derivation)	**8**	**1, 2, 6**	**R U A1 A2 E C**
Unit V	**Vector Integration** Parametric integrals of vector curves; infinitesimal line elements; line integrals and Green's theorem in a plane Multiple integrals and the Jacobian; infinitesimal surface and volume elements; surface integrals; areas of surfaces of revolution; volume integrals and determination of volumes; parameterization and coordinate conversions for integration Flux of a vector field; Gauss' divergence theorem; Stoke's theorem; applications	**9**	**1, 2, 6**	**R U A1 A2 E C**
Learning Resources: Textbooks 1. Dass, H.K. & Verma, R. (2019). *Mathematical physics* (8th ed.). S. Chand Publishing 2. Gupta, B.D. (2022). *Mathematical physics* (4th ed.). S. Chand Publishing				

3. Riley, K.F., Hobson, M.P., & Bence, S.J. (2018). *Mathematical methods for physics and engineering* (3rd ed.). Cambridge University Press
4. Nearing, J. (2010). *Mathematical tools for physicist*s. Dover Publications. http://www-mdp.eng.cam.ac.uk/web/library/enginfo/textbooks_dvd_only/nearing/math_methods.pdf
5. Thomas, G., Hass, J., Heil, C., & Weir, M. (2018). *Thomas' calculus* (14th ed.). Pearson Education
6. Spiegel, M., Lipschutz, S., & Spellman, D. (2009). *Schaum's outlines: Vector analysis* (2nd ed.). McGraw-Hill Education

Suggested Readings

1. Spiegel, M. (2009). *Schaum's outline of advanced mathematics for engineers and scientists*. McGraw-Hill Education
2. Anton, H., Bivens, I., & Davis Stephens. (2015). *Calculus* (10th ed.). Wiley
3. Kreyszig, E. (2017). *Advanced engineering mathematics* (10th ed.). Wiley
4. McMullen, C. (2018). *Essential calculus skills practice workbook with full solutions*. Zishka Publishing
5. Fernandez, O. (2017). *Everyday calculus: Discovering the hidden math all around us* (rev. ed.). Princeton University Press

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment:The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment	50	100%	50
Formative Assessment I	20	50%	10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Ms. Sujata Sinha (Signature) Mr. Bikramjit Chandra	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYMAJ102 - Mechanics and Properties of Matter

1. Course Description

Course Code	23PHYMAJ102
Course Title	Mechanics and Properties of Matter
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. Aims to train the students in the basic knowledge of Physics, and the laws governing it. b. Helps to introduce the students to conservation laws and their utility in understanding the behaviour of physical systems. c. Focuses on the motion of rigid bodies about any fixed point and any arbitrary axis passing through this point. d. Helps the students understand the elastic properties of materials and the Physics behind the characteristics of liquids. e. Helps the students develop knowledge of the central force and its characteristics, including gravitation. f. Teaches the basics of harmonic motion and its characteristics. It will help the students understand the periodic motions in Nature.
Prerequisite	Students must have an introductory knowledge of kinematics in 1 and 2D, linear and rotational motion, energy, elasticity, Newtonian gravitation, and oscillations. Must take PHYMAJ101 concurrently
Course Objectives	A student will be able to: i. Acquire preliminary knowledge of the laws of motion, the concept of Galilean invariance, the system of particles, and collisions. ii. Demonstrate the concepts of conservative and non-conservative forces, fictitious forces, translational and rotational dynamics and the ability to calculate the moment of inertia of various rigid bodies. iii. Describe the general properties of matter and the principles of elasticity, fluid flow, viscosity, and surface tension. iv. Analyse the laws of gravitation and central force motion and derive Kepler's law to demonstrate the motion of planets. v. Explain the phenomenon of simple harmonic motion and the properties of the systems executing it.
Course Outcomes based on RBT and Cognitive Level Mapping	

At the end of this course, a student will be able to:				
COs	**Statements**	**Cognitive Level Mapping**		
CO1	Define and identify the fundamental laws of motion and associated concepts such as collisions	R		
CO2	Distinguish between inertial and non-inertial reference frames and interpret the physical consequences arising from them.	U		
CO3	Apply the motion of a particle under central force motion to demonstrate the properties and characteristics of gravitation.	A1		
CO4	Examine and investigate the general properties of matter and various physical constants.	A2		
CO5	Evaluate the differential equation of simple harmonic motion and assess the nature of oscillations.	E		
CO6	Construct the motion of a rigid body including translational & rotational motion.	C		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Fundamentals of Dynamics and Non-Inertial Systems** Laws of motion, Galilean transformation, Conservation laws, System of particles and Centre of Mass, Motion of rockets. Elastic and Inelastic collisions, Laboratory and Centre of Mass frames. Conservative and non-conservative forces, Potential Energy. Potential energy curves and equilibrium. Work done by non-conservative forces. Law of Conservation of Energy. Non-inertial frames and fictitious forces. Uniformly rotating frame. Rotating coordinate systems. Centrifugal force. Coriolis force and its applications.	**13**	**1, 2**	**R U A1 A2 E C**
Unit II	**Rotational Dynamics:** Angular momentum of a particle and system of particles, Torque, Conservation of angular momentum, Rotation about a fixed axis, Rotational energy	**7**	**1, 6**	**R U A1 A2 E C**

	Moment of Inertia, Theorem of perpendicular axis and Theorem of parallel axes. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies.			
Unit III	**Properties of Matter** **Elasticity**: Stress-Strain diagram, Relation between Elastic constants – Young's modulus, Bulk's modulus and modulus of rigidity. Poisson's ratio. Work done in stretching and in twisting a wire, twisting torque on a cylinder or wire. **Viscosity**: Streamline and Turbulent flow, Equation of Continuity, Coefficient of Viscosity by Poiseuille's method and Stoke's method. **Surface Tension**: Relation between surface tension and surface energy, pressure difference across curved surface, excess pressure inside spherical liquid drop. Angle of Contact and capillary ascent. Measurement of surface tension.	**9**	**4**	**R U A1 A2 E C**
Unit IV	**Gravitation and Central Force Motion** Law of Gravitation. Gravitational potential energy, potential, and field intensity. Motion of a particle under a central force field. Two-body problem, its reduction to a one-body problem, and its solution. The energy equation and energy diagram. Kepler's Laws. Satellites in circular orbits and escape velocity.	**8**	**3**	**R U A1 A2 E C**
Unit V	**Oscillations** Simple Harmonic Motion, its differential equation and solution. Vertical oscillations of the light loaded spring, expression for force constant and determination of acceleration due to gravity. Energy and their time-average values. Damped oscillations. Forced oscillations, transient and steady states, Resonance, sharpness of resonance, power dissipation and Quality Factor.	**8**	**5**	**R U A1 A2 E C**
Learning Resources: Text Books				

1. Mathur, D.S. (2000). *Mechanics*. S. Chand & Co.
2. Lal B. & Subrahmanyam N. (2002). *Properties of matter*. S. Chand & Co
3. Murugeshan R. (2010). *Elements of properties of matter*. S. Chand & Co.
4. Chatterjee, H. & Sengupta, R. (2010). A *treatise on general properties of matter* (7th rev. ed.). New Central Book Agency (P) Limited

Suggested readings

1. Kittel, K., Knight, W. D., Ruderman, M. A., Helmholz, A. C., & Moyer, B. J. (2011). *Mechanics*. Tata McGraw-Hill
2. Halliday, D., Resnick, R., & Walker, J. (2007) *Fundamentals of physics.* John Wiley & Sons
3. Kleppner, D. & Kolenkow, R. J. (2017) *An introduction to mechanics.* McGraw Hill Education

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

Practicals

Course Code	23PHYMAJ102
Course Title	Mechanics and Properties of Matter
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. Helps introduce students to different measuring instruments and their applications and significance. b. Emphasises the need to have hands-on experience with the measurement of physical quantities and understand the theoretical concepts through practical means. c. Aims to help in estimating the physical properties of rigid bodies and the elastic and mechanical properties of different materials using scientific instruments. d. Aims to help in assessing the properties of liquids through simple experiments.
Prerequisite	Students must have an introductory knowledge of kinematics in 1 and 2D, linear and rotational motion, energy, elasticity, Newtonian gravitation, and oscillations. Must take PHYMAJ101 concurrently
Course Objectives	A student will be able to: a. Identify, choose, and calibrate appropriate measuring instruments for a particular experiment.

	b. Record experimental data in a systematic manner and compute the results using the right physical or mathematical procedures. c. Interpret and communicate their results in an appropriate manner using written reports with the necessary data visualizations. d. Check the credibility of theoretical claims from experiments. e. Nurture their scientific temperament and encourage them to build upon their experience gained from conducting experiments.

Course Outcomes based on Dave's Psychomotor Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Replicate the steps required to familiarize themselves with experiments and instruments related to the study of mechanical and elastic properties.	I
CO2	Recreate any previously imitated experiment on the study of mechanical and elastic properties.	M
CO3	Demonstrate skilled use of common measuring instruments such as callipers, gauges, measuring telescopes, etc.	P
CO4	Be proficient in the setup and use of experimental apparatus used for the study of mechanical and elastic properties.	P
CO5	Adapt or modify previously imitated experiments to analyze new mechanical and elastic properties.	A

Course Content

Units	Content	Lecture Hours	COs	Dave's
Unit I	**List of Experiments:** 1. Measurements of length/ diameter using vernier calliper, screw gauge and travelling microscope 2. Determination of *g* and velocity of freely falling body using digital timing technique 3. To study the motion of a spring and calculate: (a) it's spring constant, (b) modulus of rigidity of the spring material and (c) value of *g*. 4. To measure the radius of curvature of a spherical surface using a spherometer 5. To determine the value of *g* using a bar pendulum	**30**	**1, 2, 3,4,5**	**I M P A**

	6. To determine the surface tension of a liquid by capillary tube method 7. To determine the coefficient of viscosity of water by Poiseuille's method 8. To determine the modulus of rigidity of the material of a wire by dynamical method 9. To determine the modulus of rigidity of the material of a wire by statical method 10. To determine the modulus of rigidity of the material of a wire by Maxwell's needle 11. To determine the Young's modulus of the material of a wire by optical lever method 12. To determine the moment of inertia of a flywheel ***A minimum of EIGHT (8) experiments is to be performed***			
Learning Resources: Text Books 1. Chattopadhyay, D. & Rakshit, P. C. (2011). *An advanced course in practical physics*. New Central Book Agency (P) Limited 2. Raychaudhuri, D. P. (n.d.). *Manual of practical physics*. Allied Book Agency 3. Dasgupta, C.R. (1985). *A handbook of practical physics.* Book Syndicate Private Limited 4. Singh, H. & Hemne, P.S. (2022). *B.Sc. practical physics*. S. Chand & Co. 5. Chandra, B. (2023). *PHY MAJ102P:Mechanics - Lab guidebook for practicals*. (n.p.)				

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment for theory and practical **each**, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.
Summative Assessment (Theory):The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Summative Assessment (Practical):The Summative Assessment will be an examination of 50 marks of at least 3 hours duration. The student will be made to perform one or more experiments chosen at random from the topics given in the syllabus.

Sl. No.	Component	Marks per component
1	Practical Examination	30
2	Viva-voce	10
3	Lab notebook or Lab assignment	10
	Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment (Theory)	50	50%	25
Summative Assessment (Practical)	50		25
Formative Assessment I	20		10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Dr. Digvijay Kharga (Signature) Mr. Mayukh Mazumdar (Signature) Dr. Prajwal Chettri	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYSEC101 - Introduction to Computers & Programming

1. Course Description

Course Code	23PHYSEC101
Course Title	Introduction to Computers and Programming
Credits	3
Total Hours	90
Hours per Week	6
Course Type	Skill Enhancement Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. Introduces a student to the concept of using computers to enhance their scientific and numerical analysis skills. b. Trains a student in the construction and writing of technical scientific reports and papers. c. Teaches a student the basic concepts of programming using Python. d. Introduces tools and modules in Python used for advanced numerical and scientific analysis. e. Introduces the methods and skills needed to appropriately visualize technical data for analysis.
Prerequisite	Students must be able to type on a keyboard and use a mouse. They must have elementary knowledge of linear and polynomial equations, differentiation, integration, differential equations, statistics, and conic sections.
Course Objectives	A student will be able to: i. Learn about the benefits of FOSS software and common examples of them. ii. Write and construct a technical report or paper. iii. Acquire knowledge about the fundamentals of basic scientific and numerical programming using Python. iv. Use of common Python modules used in numerical and scientific programming, and their commonly used methods. v. Construct appropriate diagrams and charts for the purposes of data visualization and analysis.

Course Outcomes based on RBT and Cognitive Level Mapping

At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Identify the benefits of FOSS software and name common examples of them.	R

CO2	Express physical and mathematical phenomena using appropriate Python code and data visualization approaches.	U
CO3	Demonstrate physical phenomena or mathematical outcomes using Python code.	A1
CO4	Investigate a physical phenomenon computationally and outline its result in a technical report or paper.	A2
CO5	Determine parameters or evaluate the outcomes of physical situations using computational modelling with Python.	E
CO6	Design computational algorithms that replicate common physical phenomena.	C

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**FOSS and Operating Systems** **Lecture:** FOSS and its importance; the Four Essential Freedoms; meaning of proprietary software; examples of popular FOSS software and alternatives to proprietary software Operating Systems (overview only): Windows, Macintosh, Linux, Android; general overview of Linux distributions, packages and repositories **Lab:** Introduction to and the basic functions and FOSS software of the Manjaro operating system (or whichever Linux system is in use)	**6**	**1**	**R U A1 A2 E C**
Unit II	**Writing Technical Documents** **Lecture:** Overview of the LibreOffice software suite; introduction to LibreOffice Writer; fonts: serif, san-serif and monospace fonts; appropriate selection of fonts Desmos graphing calculator: line plots from functions and data points; areas, derivatives and integrals of curves, linear regression; polar plots	**14**	**4**	**R U A1 A2 E C**

	Writing and formatting a technical report/paper **Lab:** writing and formatting text; inserting and formatting images; using the formula editor; creating model graphs and graphs from data; typesetting pages for print; writing a technical report			
Unit III	**Introduction to Python Programming** **Lecture:** constants, variables and common data types; strings and string manipulation; *input()* and *print()* statements; arithmetic, comparative and boolean relations; *if-else* conditionals; *for* and *while* loops; nesting; *break* and *return*; lists and tuples: introduction, methods, and use in iteration; functions and recursion; writing files to and reading from disk; search algorithms: linear/sequential, front and back, and binary **Lab:** simple programs to demonstrate use of conditionals and loops; summation; sorting, generation of number series; searching lists; computation of areas and volumes.	**22**	**2, 3**	**R U A1 A2 E C**
Unit IV	**Modules for Scientific Computing** **Lecture:** Modules; examples of common modules used in daily and scientific computing (overview only); importing modules; the *math* module: common methods and functions The *numpy* and *scipy* modules; arrays, array operations; slicing; random number generation; the *linalg* submodule; functions for matrix and vector analysis: addition, multiplication, scalar and vector products, inverses, determinants, eigen values and vectors *solve()* - solutions of a linear system of equations; *roots()* - roots of a polynomial equation; mean and standard deviation; *polyfit()* - linear fitting to data, and *interp()* - linear interpolation; *gradient()* -	**26**	**5, 6**	**R U A1 A2 E C**

	numerical differentiation, and *trapz()* - numerical integration; *odeint()* - solutions of differential equations **Lab:** programs that demonstrate the use of modules and their inbuilt functions; conversion of coordinate systems; roots of equations used in physics; equation of a line from linear experimental data; velocity and acceleration at a point from displacement and vice-versa; areas of non-standard regions (e.g. BH loop)			
Unit V	**Data Visualization** **Lecture:** the *matplotlib* module; other popular visualization modules (overview only); formatting graphs: log and semilog axes, simple TeX notation; creating subplots Plotting of 2D data: line plots; scatter plots; histograms; polar plots Plotting of 3D data: surface plots; contour plots; colour maps **Lab:** solving and plotting trajectories of 2D motion and collisions; estimating and plotting lines of best fit for linear experimental data; plotting solutions of differential equations; line plots of curves in Cartesian and polar coordinates; plots of temperature distribution on 2D surfaces etc.	**22**	**5, 6**	**R U A1 A2 E C**

Learning Resources: (Latest edition books listed in APA style: Seventh Edition)

Open Online Resources

1. Free Software Foundation. (2021, February 2). *What is free software?* GNU Operating System. https://www.gnu.org/philosophy/free-sw.en.html
2. Linux Training Academy. (2023, n.d.). *Linux distribution: Introduction and overview*. Linux Training Academy. https://www.linuxtrainingacademy.com/linux-distribution-intro/
3. LibreOffice Documentation Team. (2022). *Writer guide 7.3*. https://documentation.libreoffice.org/assets/Uploads/Documentation/en/WG7.3/WG73-WriterGuide.pdf
4. Desmos. (2022, April 17). *Learn Desmos* [Video playlist]. Youtube. https://www.youtube.com/playlist?list=PLfM6zMGnbgOGLZc-_Yj3QVK3Vz_L4Cw59
5. Corey Schafer. (2019, April 22). *Python programming beginner tutorials* [Video playlist]. Youtube. https://www.youtube.com/playlist?list=PL-osiE80TeTskrapNbzXhwoFUiLCjGgY7

6. freeCodeCamp.org. (2019, August 7). *Python Numpy tutorial for beginners* [Video]. Youtube. https://www.youtube.com/watch?v=QUT1VHiLmmI&pp=ygUSZnJlZWNvZGVjYW1wIG51bXB5
7. Mr. P. Solver. (2021, June 1). *SciPy tutorial (2022): For physicists, engineers, and mathematicians* [Video]. Youtube. https://www.youtube.com/watch?v=jmX4FOUEfgU
8. sentdex. (2016, January 20). *Matplotlib tutorial series - Graphing in Python* [Video playlist]. Youtube. https://www.youtube.com/playlist?list=PLQVvvaa0QuDfefDfXb9Yf0la1fPDKluPF

Suggested readings

1. Stallman, R. (2015). *Free software, free society: Selected essays of Richard M. Stallman* (3rd ed.). GNU Press. https://www.gnu.org/doc/fsfs3-hardcover.pdf
2. Hering, L., & Hering, H. (2019). *How to write technical reports: Understandable structure, good design, convincing presentation*. Springer
3. Matthes, E. (2016). *Python crash course: A hands-on, project-based introduction to programming.* No Starch Press. https://bedford-computing.co.uk/learning/wp-content/uploads/2015/10/No.Starch.Python.Oct_.2015.ISBN_.1593276036.pdf
4. Sweigart, A. (2019). *Automate the boring stuff with Python* (2nd ed.). No Starch Press. https://automatetheboringstuff.com/
5. Idris, I. (2015) *Numpy beginner's guide: Build efficient, high-speed programs using the high-performance Numpy mathematical library*. Packt Publishing Ltd.
6. Johansson, R. (2018). *Numerical Python: Scientific computing and data science applications with Numpy, SciPy and Matplotlib*. Apress
7. Rougier, N. P. (2021) *Scientific visualization: Python + Matplotlib.* https://inria.hal.science/hal-03427242/document

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment:The Summative Assessment will be an examination of 50 marks of at least 3 hours duration. The student will be made to write one or more computational programs chosen at random from the topics given in the syllabus.

Sl. No.	Component	Marks per component
1	Practical Examination	30
2	Viva-voce	10

3	Lab notebook or Lab assignment	10
	Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment	50	100%	50
Formative Assessment I	20	50%	10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Mr. Bikramjit Chandra	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYMDC101 - Astronomy and Cosmology for the Curious

1. Course Description

Course Code	23PHYMDC101
Course Title	Astronomy and Cosmology for the Curious
Credits	3
Total Hours	45
Hours per Week	3
Course Type	Multi-Disciplinary Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	All Students (except students who have studied Physics)
Regulation	2023
Course Overview	This course: a. Introduces a student to the large scale structure of the Universe at a qualitative level without any mathematical or technical prerequisites. b. Introduces the student to the history of astronomy in India and abroad until the discovery of universal gravitation. c. Gives the student an overview of the Solar System and its major components, stars and galaxies. d. Introduces the student to the Lambda-CDM Standard Model of cosmology in simple terms. e. Briefly acquaints the student with the biggest open problems in modern day cosmology. f. Gives the student an overview of important space organisations and missions.
Prerequisite	Students must have graduated from higher secondary school. Students cannot have studied physics in classes 11 & 12.
Course Objectives	A student will be able to: i. Understand and appreciate the history of astronomy in India and abroad until the discovery of universal gravitation. ii. Identify and summarise the important properties of all major bodies in the Solar System. iii. Summarize the processes of the creation and evolution of stars, how they radiate energy, and how they form galaxies. iv. Understand the arguments for Big Bang cosmology, summarise the evolution of the Universe, and discuss open problems in cosmology. v. Familiarize themselves with important space agencies and significant space missions and probes.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping

CO1	Recall the history of astronomy in India and abroad until the discovery of universal gravitation.	R
CO2	Distinguish between the different major bodies within the Solar System and summarise their properties.	U
CO3	Apply qualitative physical arguments for the acceptance of the Big Bang and the current Standard Model of cosmology.	A1
CO4	Categorize and outline different open problems in cosmology like dark matter, dark energy, the fate of the Universe, etc.	A2
CO5	Critique important space agencies and significant space missions and probes.	E
CO6	Propose how the gravitational forces and fusion process within stars lead to their evolution as a singular entity and as a group in galaxies.	C

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**A Brief History of Astronomy till 1700 CE** *Astronomy in India:* Astronomy in the *Vedas*, Important Indian astronomers and their contributions *Astronomy outside India:* Brief overview of Babylonian, Hellenistic, Artistotelian, and Greco-Roman astronomy *Birth of modern astronomy:* Astronomy before Copenicus, Heliocentric model of Copernicus; Kepler's laws; Galileo's arguments; Newton and universal gravitation; Basic principles of telescopes	**7**	**1**	**R U A1 A2 E C**
Unit II	**The Solar System** *The Sun:* Structure and properties, Solar phenomena, Solar cycle and its effects on Earth *The Earth and Moon*: Earth - composition and properties, Tectonic plates, Rotation and revolution, The seasons; Moon - composition and properties, Craters, Tides, Phases, Solar and lunar eclipses, Theories of lunar origin;	**8**	**2**	**R U A1 A2 E C**

	Solar, lunar, and lunisolar calendars *The terrestrial planets*: Mercury, Venus and Mars, Possibility of life and human colonization on Mars *The gas giants*: Jupiter and Saturn, Great Red Spot, The Galilean moons, Saturn's Rings and their origin, Titan *The ice giants*: Uranus and Neptune, Rings, Axial tilt of Uranus, Great Dark Spot *Dwarf planets and the outer regions*: The asteroid belt, Meteors and meteorites, Trans-Neptunian objects, Comets, Dwarf planets, The Oort cloud, Planet 9 *The edges of our our existence*: The boundaries of the Solar System, The Voyager missions, Exoplanets			
Unit III	**Stars and Galaxies** *Setting the stage*: Important stars and constellations, Einstein's energy-mass equivalence *The birth and evolution of a star*: Protostars, Brown dwarfs, Main sequence stars, Fusion processes, White dwarfs, Red giants *The "death" of a star*: Supergiants, Supernovae, Neutron stars and pulsars, Black holes and wormholes, The origin and fate of the Solar System *Deciphering objects far away*: Measuring cosmological distances, Morphological types of galaxies and properties *How galaxies behave*: Evolution of galaxies, Clusters and groups, Superclusters, Filaments, Overview of the Milky Way and the Local Group	**11**	**6**	**R U A1 A2 E C**
Unit IV	**Cosmology** *Setting the stage*: Spacetime, Overview of Einstein's special and general relativity, Time	**13**	**3, 4**	**R U A1 A2**

	dilation *The Universe in motion*: Discovery of the expanding Universe, The Big Bang; The formation of matter; The Dark Ages; The first stars and galaxies; The present state of the Universe *What can we detect but not see?* Dark matter and dark energy *How will all things "end"*: The fate of the Universe: Big Crunch, eternal expansion, Big Rip scenarios *Are we alone in the Universe?* The Drake equation, Astrobiology and biosignatures, The Goldilocks zone, Possible candidates in the Solar System and among exoplanets, The Fermi paradox			**E C**
Unit V	**Space Organizations and Missions** *India*: ISRO: History and activities, *Aryabhatta*, *Chandrayaan*, MOM *Abroad*: NASA and ESA: the Hubble Space Telescope, the James Webb Space telescope, the Kepler Telescope, ISS, important telescopes in India and abroad *Space missions and probes*: *Sputnik* I, *Vostok* I, *Apollo* 11, *Soyuz* T-11, *Cassini-Huygens*, *Curiosity*, *New Horizons* (instructor may add or remove topics as they see fit)	**6**	**5**	**R U A1 A2 E C**

Learning Resources:

Text Books

1. Weinberg, S. (2015). *To explain the world: The discovery of modern science*. HarperCollins
2. Fox, K. C. (2002). *The Big Bang theory: What it is, where it came from, and why it works.* Jossey Bass
3. Ouellette, J (2006). *Black bodies and quantum cats: Tales of pure genius and mad science.* Oneworld Publications
4. Comins, N. F., & Kaufmann, W. J. (2005). *Discovering the Universe* (7th ed.). W.H. Freeman & Co.
5. Coles, P. (2014). Cosmology: *A very short introduction*. Oxford University Press

Suggested readings

1. Buchwald, J., & Fox, R. (Eds.). (2017). *The Oxford handbook of the history of physics*. Oxford University Press
2. Simonyi, K. (2012). *A cultural history of physics*. CRC Press

3. Maran, S. (2017). *Astronomy for dummies* (4th ed.). Wiley
4. Chaisson, E., & McMillan, S. (2014). *Astronomy today* (8th ed.). Pearson.
5. Griffiths, D. J. (2012). *Revolutions in Twentieth-century physics*. Cambridge University Press

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment:The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment	50	100%	50
Formative Assessment I	20	50%	10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Mr. Bikramjit Chandra	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYVAC101 - Quantum Crossroads I

2. Course Description

Course Code	23PHYVAC101
Course Title	Quantum Crossroads I
Credits	1
Total Hours	30
Hours per Week	2
Course Type	Value Added Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. Trains a student to plan, rehearse and present technical and mathematical information to an audience of their peers b. Provides students with an avenue to express technical information in an academic or professional environment. c. Trains students to comport themselves vocally and physically while presenting in front of an audience. d. Teaches students the use of digital aids such as slideshow software and projectors for the use of dissemination of information.
Prerequisite	Students must be majoring in Physics. Students must have a reasonable command of English
Course Objectives	A student will be able to: i. Read and understand technical information from a paper, article or other specialized manuals. ii. Analyze and break down the given information and assimilate with pre-existing knowledge. iii. Construct and present technical knowledge to an audience of their peers in a clear and lucid manner. iv. Critically evaluate and argue for or against the thesis of the paper.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Describe the details of the paper being presented	R
CO2	Interpret the paper and relate it to their pre-existing knowledge	U
CO3	Present the knowledge in a clear and lucid manner to an audience of their peers	A1

CO4	Appraise and break down the information being presented.	A2
CO5	Critique and argue for or against the thesis of the paper.	E
CO6	Design and construct a presentation that disseminates knowledge from the paper to an audience.	C

Course Structure

Session Number	Content	Total Hours	COs	RBT
1	Hours 1 & 2: Introduction to the Course	**2**	**-**	**-**
2-10	Hour 1: Presentation by one 3rd year student Hour 2: Summarized report on the presentation	**18**	**1,2,4**	**R U A2 E**
11	Hour 1: Demo presentation by faculty Hour 2: Report on demo presentation	**2**	**1,2,4**	**R U A2 E**
12-14	Hour 1: Learning Google Slides and on using Google Scholar Hour 2: Practical class for the same	**6**	**1,2,4**	**R U A2 E**
15	Hour 1: How to present oneself in front of an audience Hour 2: Practice session for the same	**2**	**3**	**A1 C**

Learning Resources:
None

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** submit the final report for Summative Assessment, and (ii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: Students have to present a written report for each presentation that they attend, and also write reports for all the practical work done in the tutorial classes. Each report will be graded out of 10 and finally converted to a fraction of 20 marks.

Summative Assessment:The Summative Assessment will be a final assignment of 25 marks.

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment	25	100%	25

Formative Assessment	10 times the number of reports	variable	20
Attendance	5	100%	5
		Total	50

Prepared by:	**Checked and verified by:**	**Approved by:**	**External Experts -** **Board of Studies**
(Signature) Mr. Bikramjit Chandra	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

SEMESTER – II

23PHYMAJ103 - Electricity and Magnetism

2. Course Description

Course Code	23PHYMAJ103
Course Title	Electricity and Magnetism
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. The course focuses on the distribution of fields near static electric charge configurations. It gives the students a basic understanding of conductors, dielectrics, polarization, and electrostatic energy. b. It helps to introduce the students to magnetic force, steady current, and magnetic phenomena. It aims to help understand the fundamentals of magnetization in matter and assess the magnetic properties of materials. c. It teaches the basics of electromagnetic induction due to time-varying fields and magnetostatic energy. d. It focuses on understanding the behaviour of the electric and magnetic fields in an electromagnetic wave.
Prerequisite	Students must have an introductory knowledge of electrostatics, magnetostatics, and electrodynamics. Students must have completed the PHYMAJ101 course
Course Objectives	A student will be able to: i. Understanding the basic properties of static electricity and applying their concepts and mathematical techniques to different cases. ii. Applications of electrostatics in conductors and dielectrics, such as capacitors, and their practical uses. iii. Understand the causes of magnetic phenomena and their properties, such as the Biot-Savart law, Ampere's law, etc. iv. Applications of magnetic properties to matter such as susceptibility, permeability, etc. v. Identifying the connection between electricity & magnetism and allied phenomena such as electromagnetic induction. vi. Studying electromagnetic theory using Maxwell's equations and applying it to electromagnetic waves in different media.
Course Outcomes based on RBT and Cognitive Level Mapping	

At the end of this course, a student will be able to:				
COs	**Statements**	**Cognitive Level Mapping**		
CO1	Define the electric field & electric potential and describe the relation of electrostatics to various aspects of electrical charge.	R		
CO2	Explain the concepts of electromagnetic induction and its applications.	U		
CO3	Calculate the magnetic field, magnetic vector potential and energy stored for various steady-current carrying systems using various methods.	A1		
CO4	Examine the wave equations from Maxwell's equations for different media and categorize the electromagnetic waves & their properties.	A2		
CO5	Evaluate various types of magnetism, such as dia-, para-, and ferro-magnetism, and draw conclusions on their properties.	E		
CO6	Formulate the electric field, electric potential, and energy stored for discrete and continuous charge systems using suitable methods.	C		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Electric Field and Electric Potential:** Electric field: Electric field lines. Electric flux. Coulomb's law. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. **Electrostatic boundary value problem and Method of Images:** Uniqueness theorem, Laplace's equation , Method of images.	**12**	**1**	**R U A1 A2 E C**

Unit II	**Electrostatics in Conductors and Dielectrics:** Conductors and Dielectrics, Electric Dipole, Dielectric Polarization, Gauss's law in Dielectric medium, Boundary Conditions. **Electrostatic Energy and Capacitor:** Electrostatic energy of a system of charged conductors, capacitors and their combinations, energy stored in a charged capacitor.	**10**	**6**	**R U A1 A2 E C**
Unit III	**Magnetic Field:** Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment. Ampere's Circuital Law and its application to (1) infinite straight wire, (2) Infinite planar surface current and (3) Solenoid. Properties of B: curl and divergence. Axial vector property of B and its consequences. Magnetic Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. Magnetic Scalar Potential.	**8**	**2**	**R U A1 A2 E C**
Unit IV	**Magnetic Properties of Matter:** Magnetization vector (M). Magnetic Intensity (H). Magnetic Susceptibility and permeability. Relation between B, H, M. Comparison of Dia-, Para- and Ferromagnetism. B-H curve and hysteresis loss.	**5**	**3**	**R U A1 A2 E C**
Unit V	**Electromagnetic Induction:** Faraday's law. Self-Inductance and Mutual Inductance. Neumann's Formula. Reciprocity Theorem. Energy stored in a Magnetic Field. **Electromagnetic Theory:** Maxwell's equations, Poynting's vector and Poynting's theorem. Wave equation in free space, dielectric medium and conducting medium. Polarization of plane electromagnetic waves, Methods of producing plane polarized light: simple reflection, double reflection and dichroism, Malus law.	**10**	**4, 5**	**R U A1 A2 E C**
Learning Resources:				

Text Books

1. Ghosh, B. (2008). *Foundations of electricity and magnetism* (3rd rev. ed.). Books & Allied (P) Limited
2. Murugeshan, R. (2019). *Electricity and magnetism* (10th ed.). S. Chand & Co.
3. Griffiths, D. J. (2015). *Introduction to electrodynamics* (4th ed.). Cambridge University Press
4. Sadiku, M. N. O. (2018). *Elements of electromagnetics* (7th ed.). Oxford University Press
5. Subrahmanyam, N., Lal, B., & Avadhanulu, M. N. (2006). *A textbook of optics* (23rd rev. ed.). S. Chand & Co.
6. Gupta, A. B. (2013). *Modern optics* (3rd ed.). Books & Allied (P) Limited

Suggested readings

1. Purcell, E. M., & Morin, D. J. (2013). *Electricity and magnetism* (3rd ed.). Cambridge University Press
2. Manohara, S. R., & Shubha A. (2018). *Electricity, magnetism and electromagnetic theory*. S. Chand & Co.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

Practicals

Course Code	23PHYMAJ103
Course Title	Electricity and Magnetism
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. The course provides the knowledge to measure various physical quantities through a scientific approach. b. It aims to help in estimating various electric and magnetic properties of materials using scientific apparatus. c. It focuses on giving training in the use of precision measurements, calibration, and error analysis.
Prerequisite	Students must have an introductory knowledge of electrostatics, magnetostatics, and electrodynamics. Students must have completed the PHYMAJ101 course
Course Objectives	A student will be able to: i. Enabling the students to determine unknown resistances by applying the principles of the potentiometer and Carey Foster's bridge.

	ii. Enabling students to compute magnetic field strength and its gradient and determine energy losses from the hysteresis. iii. Enabling students to produce and detect plane polarized light and graphically construct patterns to prove polarization laws. iv. Enabling students to analyze plane polarized light and to map it graphically v. Enabling students to record experimental data in a systematic manner and hence construct the experiment report on paper. vi. Computing experimental results from the working formulae and graphs and interpreting the results.

Course Outcomes based on Dave's Psychomotor Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Replicate the steps required to familiarize themselves with experiments and instruments related to the study of electricity and magnetism.	I
CO2	Recreate any previously imitated experiment on the study of electricity and magnetism.	M
CO3	Demonstrate skilled use of common measuring instruments such as galvanometers, Wheatstone bridges, polarizers, etc.	P
CO4	Be proficient in the setup and use of experimental apparatus used for the study of electricity and magnetism.	P
CO5	Adapt or modify previously imitated experiments to analyze new properties from electricity and magnetism.	A

Course Content

Units	Content	Lecture Hours	COs	Dave's
Unit I	**List of Experiments:** 1. To determine an unknown Low Resistance using Potentiometer. 2. To determine an unknown Low Resistance using Carey Foster's Bridge. 3. Measurement of field strength B and its variation in a solenoid (determine dB/dx)	**30**	**1, 2, 3,4,5**	**I M P A**

	4. To determine self-inductance of a coil by Anderson's bridge. 5. To study polarization of light by reflection and determine the polarizing angle for air-glass interface. 6. To verify Malus law for plane polarized light. 7. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis. 8. To verify Brewster's law for plane polarized light. 9. To determine internal resistance of a cell using (a) potentiometer and (b) voltmeter & ammeter. 10. To measure large EMF by means of a potentiometer. ***A minimum of EIGHT (8) experiments is to be performed***			
Learning Resources: Text Books 1. Chattopadhyay, D., & Rakshit, P. C. (2011). *An advanced course in practical physics*. New Central Book Agency (P) Limited 2. Raychaudhuri, D. P. (n.d.). *Manual of practical physics*. Allied Book Agency 3. Dasgupta, C.R. (1985). *A handbook of practical physics*. Book Syndicate Private Limited 4. Singh, H., & Hemne, P.S. (2022). *B.Sc. practical physics*. S. Chand & Co.				

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment for theory and practical **each**, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment (Theory):The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Summative Assessment (Practical):The Summative Assessment will be an examination of 50 marks of at least 3 hours duration. The student will be made to perform one or more experiments chosen at random from the topics given in the syllabus.

Sl. No.	Component	Marks per component
1	Practical Examination	30
2	Viva-voce	10
3	Lab notebook or Lab assignment	10
	Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment (Theory)	50	50%	25
Summative Assessment (Practical)	50		25
Formative Assessment I	20		10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Ms. Sujata Sinha (Signature) Dr. Digvijay Kharga	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYMAJ104 - Waves and Optics

3. Course Description

Course Code	23PHYMAJ104
Course Title	Waves and Optics
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. The course helps students get familiarised with important aspects of waves and oscillations and hence study different optical phenomena. b. It helps students study the nature of waves in a generic manner. c. It helps students describe the course of waves through different materials. d. It makes students acquainted with the history of development of light, with brevity. e. It helps students describe different optical phenomena like interference and diffraction. f. It helps the students to build a strong background for different experiments. g. It bolsters the drawing skills (ray diagrams, experimental setups, fringe patterns, etc.) of the students.
Prerequisite	Students must have an introductory knowledge of oscillations, waves, superpositions, and light. Students must have completed the PHYMAJ101 and MATMIN101 courses.
Course Objectives	A student will be able to: i. Introduce the basic concepts of superposition principle, Lissajous figures, wave motion, coherence, interference, and diffraction phenomena. ii. Apply the superposition principle and Huygen's principle to explain important phenomena in waves and optics. iii. Describe the workings of interferometers and judge their relative importance in physics. iv. Explain the motion of waves in different media with the help of key concepts and mathematics. v. Draw and explain interference and diffraction patterns.

	vi. Explain the setup for important experiments like Melde's experiment and Young's double-slit experiments, and hence describe the significance of the results.			
Course Outcomes based on RBT and Cognitive Level Mapping At the end of this course, a student will be able to:				
COs	**Statements**	**Cognitive Level Mapping**		
CO1	Describe waves of various kinds and their properties in terms of differential equations and their solutions.	R		
CO2	Summarize the wave theory of light and explain the concept of waveguides.	U		
CO3	Apply the concept of fringe formation and calculate the wavelength of light.	A1		
CO4	Differentiate between interference and diffraction phenomena of light.	A2		
CO5	Select optical instruments such as standard light sources, spectrometers, grating, slits, etc. for the purpose of evaluating various optical properties.	E		
CO6	Use the superposition principle to formulate the resultant displacement in various kinds of physical situations.	C		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Superposition of Harmonic oscillations** **Collinear:** Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences. **Perpendicular:** Graphical and Analytical	**7**	**1, 3, 6**	**R U A1 A2 E C**

	Methods. Lissajous Figures with equal and unequal frequency and their uses.			
Unit II	**Wave Motion** Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves **Velocity of Waves** Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.	**8**	**1,2,3, 5, 6**	**R U A1 A2 E C**
Unit III	**Superposition of Two Harmonic Waves** Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves.	**7**	**1,3,4**	**R U A1 A2 E C**
Unit IV	**Nature of Light** A brief history of light, the corpuscular and wave theories of light, electromagnetic nature of light (qualitative discussions only), Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **Introduction to Interference:** Coherence (brief qualitative discussion), Young's double-slit experiment - derivation of fringe width, conditions for observable interference **Interference by Division of Wavefront:** Fresnel's Biprism - qualitative analysis of fringe pattern, applications (determine of unknown wavelength and thickness of thin sheet); interference with white light	**14**	**3,4,5, 6**	**R U A1 A2 E C**

	Interference by Division of Amplitude: Stokes' treatment, interference in thin films (wedge-shaped and parallel films), Newton's rings - analysis of interference pattern and applications **Interferometers:** The Michelson Interferometer - qualitative discussions on construction, formation of fringes and importance in physics; determination of wavelength of light			
Unit V	**Diffraction of Light** **Introduction to Diffraction:** Interference versus Diffraction, Classification of Diffraction types **Fraunhofer Type Diffraction:** Single slit and double slit diffraction - qualitative discussions on diffraction pattern and positions of maxima and minima;the theory of plane transmission grating; resolving and dispersive power of a grating **Fresnel Type Diffraction:** Fresnel's half period zones, zone plate theory, comparison between zone plate and convex lens, diffraction at a: circular aperture and thin wire (only qualitative discussion of the fringe patterns)	**9**	**3, 4, 5**	**R U A1 A2 E C**

Learning Resources:

Text Books

1. Ghatak, A. (2017). *Optics* (6th ed). McGraw Hill Education (India)
2. Gupta, A. B. (2013). *Modern optics* (4th ed.). Books and Allied (P) Ltd.
3. Bajaj, N. K. (2017). *The physics of waves and oscillations*. Tata McGraw-Hill
4. Chaudhuri, R. N. (2010). *Waves and oscillations* (2nd ed.). New Age International Publishers
5. Chattopadhyay, D., & Rakshit, P. C. (2011). *Vibrations, waves and acoustics*. Books & Allied (P) Ltd.
6. Jenkins, F. A. & White, H. E. (2017). *Fundamentals of optics* (4th Indian ed.). McGraw Hill Education.

Suggested readings

1. Parthasarathy, H. (2019). *Waves and optics*. CRC Press
2. Hecht, E. (2019). *Optics*. Pearson
3. Kumar, A., Gulati, H. R. & Khanna, D. R. (n.d.). *Fundamentals of optics*. R. Chand Publications
4. Pain, H. J. (2006). *The physics of vibrations and waves* (6th ed.). John Wiley and Sons

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

Practicals

Course Code	23PHYMAJ203
Course Title	Waves and Optics
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. The course helps students get acquainted with different instruments (especially pertinent to the experiments of optics) and their applications and limitations. b. It emphasises the necessity of hands-on experience with the measurement of physical quantities and understanding theoretical concepts through experiments. c. It aims to help in estimating the quantifiers and studying important properties related to different optical phenomena through experiments. d. It aims to help study important properties of waves and oscillations through experiments. e. It aims to make students accustomed to working in the dark room (for optics experiments only).
Prerequisite	Students must have an introductory knowledge of oscillations, waves, superpositions, and light. Students must have completed the PHYMAJ101 and MATMIN101 courses.
Course Objectives	A student will be able to: i. Enabling students to identify the important parts of an instrument and understand the significance of the constants of an instrument. ii. Setting up the experiment by properly assorting important components. iii. Enabling the students to record experimental data in a systematic manner and hence construct the experiment report on paper. iv. Computing the experimental results mathematically from the graphs with the help of a working formula. v. Making visual representations of the experimental data, wherever necessary (primarily graphs), and hence interpreting the results.

	vi. Nurturing the scientific temperament among the students and encouraging them to reflect on their personal experiences of conducting the experiments.			
Course Outcomes based on Dave's Psychomotor Mapping At the end of this course, a student will be able to:				
COs	**Statements**	**Cognitive Level Mapping**		
CO1	Replicate the steps required to familiarize themselves with experiments and instruments related to the study of waves and optics.	I		
CO2	Recreate any previously imitated experiment on the study of waves and optics.	M		
CO3	Demonstrate skilled use of common measuring instruments such as spectrometers, light sources, lasers, gratings, etc.	P		
CO4	Be proficient in the setup and use of experimental apparatus used for the study of waves and optics.	P		
CO5	Adapt or modify previously imitated experiments to analyze new properties from waves and optics.	A		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**Dave's**
Unit I	**List of Experiments:** 1. To determine the velocity of sound through a wire using sonometer 2. To study Lissajous Figures (with phase analyses for different phases) 3. To verify the laws of transverse vibrations using Melde's apparatus 4. To determine the frequency of an electric tuning fork by Melde's experiment and verify the square of wavelength - time period law 5. To study the vibration of guitar strings 6. To determine the angle of a prism	**30**	**1, 2, 3,4,5**	**I M P A**

	7. To determine the refractive index of material of a prism using a sodium source 8. To determine the dispersive power and Cauchy constants of the material of a prism using a mercury source 9. To determine the wavelength of sodium light using Fresnel's Biprism 10. To determine the wavelength of sodium light using Newton's Rings method 11. To determine the refractive index of a liquid using Newton's Rings method 12. To determine the wavelength of a laser source using single slit diffraction 13. To determine the wavelength of (a) sodium light and (b) spectral lines of mercury source using a plane diffraction grating 14. To study the diffraction at a straight wire. ***A minimum of EIGHT (8) experiments is to be performed***			

Learning Resources:
Text Books

1. Chattopadhyay, D., & Rakshit, P. C. (2011). *An advanced course in practical physics*. New Central Book Agency (P) Limited
2. Raychaudhuri, D. P. (n.d.). *Manual of practical physics*. Allied Book Agency
3. Dasgupta, C.R. (1985). *A handbook of practical physics*. Book Syndicate Private Limited
4. Singh, H., & Hemne, P.S. (2022). *B.Sc. practical physics*. S. Chand & Co.

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment for theory and practical **each**, (ii) the student must be present for

Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.
Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment (Theory):The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Summative Assessment (Practical):The Summative Assessment will be an examination of 50 marks of at least 3 hours duration. The student will be made to perform one or more experiments chosen at random from the topics given in the syllabus.

Sl. No.	Component	Marks per component
1	Practical Examination	30
2	Viva-voce	10
3	Lab notebook or Lab assignment	10
	Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment (Theory)	50	50%	25
Summative Assessment (Practical)	50		25
Formative Assessment I	20		10
Formative Assessment II	50		25

Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	**Checked and verified by:**	**Approved by:**	**External Experts -** **Board of Studies**
(Signature) Dr. Prajwal Chettri (Signature) Mr. Mayukh Mazumdar	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYSEC102 - Practical Electricity

4. Course Description

Course Code	23PHYSEC102
Course Title	Practical Electricity
Credits	3
Total Hours	60
Hours per Week	4
Course Type	Skill Enhancement Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. The course aims to provide knowledge on practical electrical circuits. b. The students will have an understanding of application of resistors, inductors and capacitors in circuits. c. Students will learn maintenance practices for electrical equipment and systems. d. Students will learn the importance of electrical safety practices, including proper grounding, insulation, and handling of electrical hazards. e. Students will develop skills in diagnosing and troubleshooting electrical problems in circuits and systems.
Prerequisite	Students must have an introductory knowledge of electromagnetic theory and electric circuits. Students must be taking PHYMAJ103 concurrently
Course Objectives	A student will be able to: i. Understanding the basic concepts and laws of electrical circuits, such as voltage, current, resistance, Ohm's Law, etc., and their applications. ii. Developing techniques to analyze and solve electrical circuits such as Kirchhoff's laws, nodal analysis, and mesh analysis. iii. Identifying and understanding the characteristics of active and passive electrical components and analyzing the transient and steady-state responses of circuits. iv. Understanding the principles of electrical power generation, transmission, and distribution along with different types of electrical systems, such as single-phase and three-phase systems. v. Introducing the student to electrical codes, standards, and regulations related to wiring and electrical installations. vi. Understanding the principles of electrical safety and the importance of following proper procedures.
Course Outcomes based on RBT and Cognitive Level Mapping	

At the end of this course, a student will be able to:				
COs	**Statements**	**Cognitive Level Mapping**		
CO1	Identify and recall the basic concepts and laws of electrical circuits, such as voltage, current, resistance, Ohm's Law, etc., and their applications.	R		
CO2	Summarize the principles of electrical power generation, transmission, and distribution along with different types of electrical systems, such as single-phase and three-phase systems.	U		
CO3	Apply techniques of analysis such as Kirchhoff's laws, nodal analysis, mesh analysis, etc., to calculate electrical circuit parameters.	A1		
CO4	Analyze various active and passive electrical components and investigate their characteristics and behaviour in electric circuits.	A2		
CO5	Recommend and argue for the correct procedure to implement in accordance with the principles of electrical safety.	E		
CO6	Propose and correctly interpret the various standards related to electrical codes and regulations related to wiring and electrical installations.	C		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Basic Electricity Principles** Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. Ammeters, voltmeters, galvanometers and conversion of galvanometer to either instrument. AC Electricity and DC Electricity. Ideal Constant-voltage and Constant-current Sources.	**6**	**1, 4**	**R U A1 A2 E C**
Unit II	**Electrical Circuits** AC Circuits: Kirchhoff's laws for AC circuits. Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt.	**8**	**1, 3, 4**	**R U A1 A2**

	Response of inductors and capacitors with DC and AC sources. DC circuit theory: Kirchhoff's laws for DC circuits, voltage division, current division, Y (Wye)-delta transformations. RC and RL in DC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit			**E C**
Unit III	**Network theorems** Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits.	**5**	**3**	**R U A1 A2 E C**
Unit IV	**Generators, Motors and Transformers** DC Power sources. AC/DC generators. Single-phase, three-phase & DC motors. Basic design. Speed & power of ac motor Operation of transformers.	**5**	**1,6**	**R U A1 A2 E C**
Unit V	**Electrical Protection** Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device)	**6**	**5,6**	**R U A1 A2 E C**

Learning Resources:

Text Books

1. Mahajan, S., & Choudhury, S. R. (2017). *Electricity, magnetism and electromagnetic theory*. Tata McGraw-Hill
2. Yarwood, J. (1973). *Electricity and magnetism*. University Tutorial Press. https://archive.org/details/electricitymagne0000yarw/page/n7/mode/2up
3. Say, M. G. (2002). *Performance and design of alternating current machines* (3rd ed.). CBS Publishers and Distributors.
4. Theraja, B. L., Theraja, A. K., & Tarnekar, S. G. (2019). *A textbook of electrical technology: Basic electrical engineering* (Volume 1) (23rd rev. ed.). S Chand & Co.
5. Theraja, B. L., Theraja, A. K., & Tarnekar, S. G. (2019). *A textbook of electrical technology: AC & DC machines* (Volume 2) (23rd rev. ed.). S Chand & Co.
6. Purcell, E. M., & Morin, D. J. (2013) *Electricity and magnetism* (3rd ed.). Cambridge University Press

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

Practicals

Course Code	23PHYSEC102
Course Title	Practical Electricity
Credits	3
Total Hours	60
Hours per Week	4
Course Type	Skill Enhancement Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: 1. The course helps students get acquainted with different circuit components. 2. It focuses on hands-on experience with the measurement of physical quantities and understanding theoretical concepts through experiments. 3. It aims to help in studying important properties related to transient phenomena of electricity through experiments.
Prerequisite	Students must have an introductory knowledge of electromagnetic theory and electric circuits. Students must be taking PHYMAJ103 concurrently
Course Objectives	A student will be able to: i. Studying the characteristics of circuit components. ii. Proving the network theorems experimentally. iii. Analyzing and understanding the characteristics of series and parallel LCR circuits. iv. Learning about electrical protection components. v. Constructing a motion sensor for the operation of an automatic lighting system. vi. Construct a single phase DC motor and to find the average power generated by the motor.

Course Outcomes based on Dave's Psychomotor Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Replicate the steps required to familiarize themselves with experiments and instruments related to the study of electric circuits.	I
CO2	Recreate any previously imitated experiment on the study of electric circuits.	M
CO3	Demonstrate skilled use of common electrical instruments such as multimeters, relays, bread boards, etc.	P

CO4	Be proficient in the setup and use of experimental apparatus used for the study of electric circuits.	P		
CO5	Adapt or modify previously imitated experiments to analyze new properties from electric circuits.	A		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**Dave's**
Unit I	**List of Experiments:** 1. To study the characteristics of a series RC Circuit. 2. To verify the Thevenin and Norton theorems. 3. To verify the Superposition, and Maximum power transfer theorems. 4. To study the response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width. 5. To study the response curve of a parallel LCR circuit and determine its (a) Anti- resonant frequency and (b) Quality factor Q. 6. To construct a single phase DC motor and to find the average power generated by the motor. 7. To construct a relay alarm in case of an overloaded circuit. 8. To construct a motion sensor for the operation of an automatic lighting system. 9. To calibrate voltmeter and ammeter using potentiometer.	**30**	**1, 2, 3,4,5**	**I M P A**

Learning Resources:

Text Books

1. Chattopadhyay, D., & Rakshit, P. C. (2011). *An advanced course in practical physics*. New Central Book Agency (P) Limited
2. Raychaudhuri, D. P. (n.d.). *Manual of practical physics*. Allied Book Agency
3. Dasgupta, C.R. (1985). *A handbook of practical physics*. Book Syndicate Private Limited
4. Singh, H., & Hemne, P.S. (2022). *B.Sc. practical physics*. S. Chand & Co.

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment for theory and practical **each**, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment (Theory):The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Summative Assessment (Practical):The Summative Assessment will be an examination of 50 marks of at least 3 hours duration. The student will be made to perform one or more experiments chosen at random from the topics given in the syllabus.

Sl. No.	Component	Marks per component
1	Practical Examination	30

2	Viva-voce	10
3	Lab notebook or Lab assignment	10
	Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment (Theory)	50	50%	25
Summative Assessment (Practical)	50		25
Formative Assessment I	20		10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Ms. Sujata Sinha (Signature) Dr. Prajwal Chettri	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYMIN102 - Mechanics

5. Course Description

Course Code	23PHYMIN102
Course Title	Mechanics
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Students not from Physics
Regulation	2023
Course Overview	This course: a. The course aims to train the students in the basic knowledge of Physics, and the laws governing it. b. It helps to introduce the students to conservation laws and their utility in understanding the behaviour of physical systems. c. It aims to introduce the student to the special theory of relativity. d. It focuses on the motion of rigid bodies about any fixed point and any arbitrary axis passing through this point. e. It helps the students understand the elastic properties of materials and the Physics behind the characteristics of liquids. f. It helps the students develop knowledge of the central force and its characteristics, including gravitation. g. It teaches the basics of harmonic motion and its characteristics. It will help the students understand the periodic motions in Nature.
Prerequisite	Students should have elementary knowledge of vectors, algebra, calculus, kinematics, linear and rotational dynamics, energy, elasticity, and oscillations.
Course Objectives	A student will be able to: i. Acquire preliminary knowledge and the mathematics required for the laws of motion, the concept of Galilean invariance, the system of particles, and collisions. ii. Demonstrate the concepts of conservative and non-conservative forces, equilibrium, and fictitious forces that arise in non-inertial reference frames. iii. Understand the analogy between translational and rotational dynamics and the ability to calculate the moment of inertia of various rigid bodies. iv. Describe the general properties of matter and the principles of elasticity, fluid flow, viscosity, and surface tension. v. Analyze the laws of gravitation and central force motion and derive Kepler's law to demonstrate the motion of planets. vi. Explain the phenomenon of simple harmonic motion and the properties of the systems executing it.

Course Outcomes based on RBT and Cognitive Level Mapping At the end of this course, a student will be able to:				
COs	**Statements**	**Cognitive Level Mapping**		
CO1	Define and identify the fundamental laws of motion and associated concepts such as collisions.	R		
CO2	Distinguish between inertial and non-inertial reference frames and interpret the physical consequences arising from them.	U		
CO3	Apply the motion of a particle under central force motion to demonstrate the properties and characteristics of gravitation.	A1		
CO4	Analyse the motion of a rigid body, including translational and rotational motion.	A2		
CO5	Evaluate the differential equation of simple harmonic motion and assess the nature of oscillations.	E		
CO6	Combine and investigate the general properties of matter and various physical constants.	C		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**Vectors:** Vector Algebra, Scalar and Vector products, Derivatives of a vector with respect to a parameter, Radial and Transverse components of velocity and acceleration, Uniform Circular Motion. **Ordinary Differential Equations:** 1st order homogeneous differential equations, 2nd order homogeneous differential equations with constant coefficients. **Fundamentals of Dynamics:** Laws of motion, Galilean transformation, Conservation laws, System of particles and Centre of Mass, Motion of rockets.	**10**	**1, 2**	**R U A1 A2 E C**

	Collisions: Elastic and Inelastic collisions, Laboratory and Centre of Mass frames.			
Unit II	**Work and Energy:** Conservative and non-conservative forces, Potential Energy. Potential energy curves and equilibrium. Work done by non- conservative forces. Law of Conservation of Energy. **Special Theory of Relativity:** Historical background of Special Theory of Relativity, Postulates. Length contraction. Time dilation. Twin paradox. Relativistic addition of velocities. Relativistic variation of mass, mass-energy equivalence. **Non-Inertial Systems**: Non-inertial frames and fictitious forces. Uniformly rotating frame. Rotating coordinate systems. Centrifugal force. Coriolis force,	**8**	**4, 6**	**R U A1 A2 E C**
Unit III	**Rotational Dynamics:** Angular momentum of a particle and system of particles, Torque, Conservation of angular momentum, Rotation about a fixed axis, Rotational energy, Moment of Inertia, Theorem of perpendicular axis and Theorem of parallel axes. Flywheel, theory of compound pendulum and determination of acceleration due to gravity. **Gravitation and Central Force Motion:** Law of Gravitation. Gravitational potential energy, potential, and field intensity. Motion of a particle under a central force field and Kepler's Laws (statement only). Satellites in circular and geosynchronous orbits.	**12**	**3, 4**	**R U A1 A2 E C**
Unit IV	**Elasticity**: Stress-Strain diagram, Relation between Elastic constants – Young's modulus, Bulk's modulus and modulus of rigidity. Poisson's ratio. Work done in stretching and in twisting a wire, twisting torque on a cylinder or wire.	**9**	**6**	**R U A1 A2 E C**

	Viscosity: Streamline and Turbulent flow, Equation of Continuity, Coefficient of Viscosity. **Surface Tension**: Relation between surface tension and surface energy. Angle of Contact and capillary ascent.			
Unit V	**Oscillations**: Simple Harmonic Motion, its differential equation and solution. Vertical oscillations of the light loaded spring, expression for force constant and determination of acceleration due to gravity. Energy and their time-average values. Damped oscillations (Overview).	**6**	**5**	**R U A1 A2 E C**

Learning Resources:

Text Books

1. Mathur, D.S. (2000). *Mechanics*. S. Chand & Co.
2. Lal B. & Subrahmanyam N. (2002). *Properties of matter*. S. Chand & Co
3. Murugeshan R. (2010). *Elements of properties of matter*. S. Chand & Co.
4. Chatterjee, H. & Sengupta, R. (2010). A *treatise on general properties of matter* (7th rev. ed.). New Central Book Agency (P) Limited

Suggested readings

1. Kittel, K., Knight, W. D., Ruderman, M. A., Helmholz, A. C., & Moyer, B. J. (2011). *Mechanics*. Tata McGraw-Hill
2. Halliday, D., Resnick, R., & Walker, J. (2007) *Fundamentals of physics.* John Wiley & Sons
3. Kleppner, D. & Kolenkow, R. J. (2017) *An introduction to mechanics.* McGraw Hill Education

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

Practicals

Course Code	23PHYMIN101
Course Title	Mechanics
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Major
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Students not from Physics
Regulation	2023

Course Overview	This course: a. The course helps introduce students to different measuring instruments and their applications and significance. b. It emphasises the need to have hands-on experience with the measurement of physical quantities and understand the theoretical concepts through practical means. c. It aims to help in estimating the physical properties of rigid bodies and the elastic and mechanical properties of different materials using scientific instruments. d. It aims to help in assessing the properties of liquids through simple experiments.
Prerequisite	Students should have elementary knowledge of vectors, algebra, calculus, kinematics, linear and rotational dynamics, energy, elasticity, and oscillations.
Course Objectives	A student will be able to: i. Identify, choose, and calibrate appropriate measuring instruments for a particular experiment. ii. Record experimental data in a systematic manner and compute the results using the right physical or mathematical procedures. iii. Interpret and communicate their results in an appropriate manner using written reports with the necessary data visualizations. iv. Check the credibility of theoretical claims from experiments. v. Nurture their scientific temperament and encourage them to build upon their experience gained from conducting experiments.

Course Outcomes based on Dave's Psychomotor Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Replicate the steps required to familiarize themselves with experiments and instruments related to the study of mechanical and elastic properties.	I
CO2	Recreate any previously imitated experiment on the study of mechanical and elastic properties.	M
CO3	Demonstrate skilled use of common measuring instruments such as callipers, gauges, measuring telescopes, etc.	P
CO4	Be proficient in the setup and use of experimental apparatus used for the study of mechanical and elastic properties.	P
CO5	Adapt or modify previously imitated experiments to analyze new mechanical and elastic properties.	A

Course Content

Units	Content	Lecture Hours	COs	Dave's
Unit I	**List of Experiments:** 1. Measurements of length/ diameter using vernier calliper, screw gauge and travelling microscope 2. Determination of *g* and velocity of freely falling body using digital timing technique 3. To study the motion of a spring and calculate (a) it's spring constant, (b) modulus of rigidity of the spring material and (c) value of *g*. 4. To determine the value of *g* using a bar pendulum 5. To determine the surface tension of a liquid by capillary tube method 6. To determine the modulus of rigidity of the material of a wire by dynamical method 7. To determine the modulus of rigidity of the material of a wire by Maxwell's needle 8. To determine the Young's modulus of the material of a wire by optical lever method 9. To determine the moment of inertia of a flywheel ***A minimum of EIGHT (8) experiments is to be performed***	**30**	**1, 2, 3,4,5**	**I M P A**

Learning Resources:
Text Books

1. Chattopadhyay, D., & Rakshit, P. C. (2011). An advanced course in practical physics. New Central Book Agency (P) Limited
2. Raychaudhuri, D. P. (n.d.). Manual of practical physics. Allied Book Agency
3. Dasgupta, C.R. (1985). A handbook of practical physics. Book Syndicate Private Limited
4. Singh, H., & Hemne, P.S. (2022). B.Sc. practical physics. S. Chand & Co.
5. Chandra, B. (2023). *PHY MINOR:Mechanics - Lab guidebook for practicals*. (n.p.)

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment for theory and practical **each**, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.
Summative Assessment (Theory):The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10
B	5	4	6	20
C	10	2	4	20
			Total	**50**

Summative Assessment (Practical):The Summative Assessment will be an examination of 50 marks of at least 3 hours duration. The student will be made to perform one or more experiments chosen at random from the topics given in the syllabus.

Sl. No.	Component	Marks per component
1	Practical Examination	30
2	Viva-voce	10
3	Lab notebook or Lab assignment	10
	Total	**50**

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment (Theory)	50		25

Summative Assessment (Practical)	50	50%	25
Formative Assessment I	20		10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Dr. Digvijay Kharga (Signature) Mr. Mayukh Mazumdar (Signature) Dr. Prajwal Chettri	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYMDC102 - Quantum Physics for the Curious

3. Course Description

Course Code	23PHYMDC102
Course Title	Quantum Physics for the Curious
Credits	3
Total Hours	45
Hours per Week	3
Course Type	Multi-Disciplinary Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	All Students (except students who have studied Physics)
Regulation	2023
Course Overview	This course: a. Introduce a student to the physics of the very small at a qualitative level without any mathematical or technical prerequisites. b. Introduce the student to the history of the development of quantum theory and its effect on physics c. Give the student a qualitative overview of the Standard Model of particle physics and the experimental apparatus required. d. Briefly acquaint the student with the practical applications of quantum theory. e. Give the student an overview of the modern fields of quantum computing and quantum cryptography.
Prerequisite	Students must have graduated from higher secondary school. Students cannot have studied physics in classes 11 & 12.
Course Objectives	A student will be able to: i. Understanding the history and reasons for the development of quantum theory. ii. Identifying the main ideas and developments in old quantum theory. iii. Identifying the main ideas and developments during the first quantum revolution and its impact on the foundations of physics. iv. Outlining the basic principles of the Standard Model of Particle Physics and its major components, and identifying the major experiments devoted to the field, e.g., CERN. v. Outlining the important practical applications of quantum theory in electronics, chemistry, telecommunications, and imaging. vi. Familiarizing themselves with the ideas of quantum entanglement and its extension into the modern fields of quantum cryptography and quantum computing.
Course Outcomes based on RBT and Cognitive Level Mapping At the end of this course, a student will be able to:	

COs	Statements	Cognitive Level Mapping
CO1	Describe the history and identify the reasons for the development of quantum theory.	R
CO2	Discuss the basic principles of the Standard Model of particle physics and summarize the major experiments devoted to the field.	U
CO3	Qualitatively present the ideas of quantum entanglement and its applications.	A1
CO4	Appraise the main ideas and developments during the first quantum revolution and analyze its impact on the foundations of physics.	A2
CO5	Critique the main ideas and developments in old quantum theory and the first quantum revolution.	E
CO6	Generate the important practical applications of quantum theory in electronics, chemistry, telecommunications, and imaging.	C

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**Old Quantum Theory** *Background information*: The nature of waves; Einstein's special theory of relativity; The spectral lines of hydrogen; the ultraviolet catastrophe *Physics becomes confusing:* The introduction of quanta and the photon; early atomic models; the wave-particle duality of light. *Lights in the darkness:* Matter waves; exclusion principle	**12**	**1,5**	**R U A1 A2 E C**
Unit II	**The First Quantum Revolution** *The birth of quantum mechanics*: Schrodinger's equation; Heisenberg's uncertainty principle; Dirac's antimatter prediction	**11**	**4,5**	**R U A1 A2 E C**

	The death of classical physics: The probabilistic nature of quantum theory; deterministic vs probabilistic schools of thought *A philosophical interlude*: The measurement problem; the Many-World's interpretation and the multiverse			
Unit III	**The Standard Model of Particle Physics** *The most fundamental of all things*: Discoveries of the electron, proton and neutron; overview of the current Standard Model *Discovering the building blocks*: Particle accelerators: CERN, LIGO, IndIGO, and other examples	**8**	**2**	**R U A1 A2 E C**
Unit IV	**Applications of Quantum Mechanics** *Revolutions in technology*: The electronics revolution; lasers, holography and the telecommunications revolution; MRIs; next generation microscopes; superconductivity and exotic states of matter (brief overview)	**7**	**6**	**R U A1 A2 E C**
Unit V	**The Second Quantum Revolution** *Quantum entanglement is weird*: quantum entanglement and its experimental verification *Present day revolutions*: Quantum information; overview of quantum cryptography and quantum computing	**7**	**3**	**R U A1 A2 E C**
Learning Resources:				

Text Books

1. Gribbin, J. (1985). *In search of Schrodinger's cat: Quantum physics and reality*. Black Swan
2. Gamov, G. & Stannard, R. (2001). *The new world of Mr Tompkins* (3rd rev. ed.). Cambridge University Press
3. Rae, A. (2005). *Quantum physics: Beginner's guide*. Pan MacMillian India
4. Baggott, J. (2011). *The quantum story: A history in 40 moments*. Oxford University Press
5. Oerter, R. (2006). *The theory of almost everything: The Standard Model, the unsung triumph of modern physics*. Plume
6. Zeilinger, A. (2023). *Dance of the photons: Einstein, entanglement and quantum teleportation*. Penguin

Suggested readings

1. Simonyi, K. (2012). *A cultural history of physics*. CRC Press
2. Brush, S. (2015). *Making 20th Century science: How theories became knowledge*. Oxford University Press
3. Kumar, M. (2011). *Quantum: Einstein, Bohr and the great debate about the nature of reality*. W.W. Norton & Co.
4. Buchwald, J., & Fox, R. (Eds.). (2017). *The Oxford handbook of the history of physics.* Oxford University Press
5. Zukav, G. (2009). *The dancing Wu Li masters*. HarperOne
6. Baggott, J. (2020). *Quantum reality*. Cambridge University Press
7. Schumm, B. A. (2004). *Deep down things: The breathtaking beauty of particle physics.* The Johns Hopkins University Press
8. Gilder, L. (2009). *The age of entanglement: When quantum physics was reborn*. Knopf

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** be present for and score a minimum of 40% in the Summative Assessment, (ii) the student must be present for Formative Assessment II (Mid-Semester Examinations), and (iii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: 50 marks distributed across three different forms of Assessment. Evaluated as per the Assessment & Evaluation Framework Document of Salesian College.

Summative Assessment:The Summative Assessment will be a written examination of 50 marks of at least 2 hours duration, using the RBT categorization and scheme.

Section	Marks per question	No. of questions to be answered	No. of questions given	Total marks for Section
A	2	5	8	10

B	5	4	6	20
C	10	2	4	20
			Total	**50**

Evaluation Scheme of the entire Course

Component	**Marks**	**Final Weightage**	**Final Marks**
Summative Assessment	50	100%	50
Formative Assessment I	20	50%	10
Formative Assessment II	50		25
Formative Assessment III	20		10
Attendance	5	100%	5
		Total	100

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Mr. Bikramjit Chandra	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

23PHYVAC102 - Quantum Crossroads II

4. Course Description

Course Code	23PHYVAC102
Course Title	Quantum Crossroads II
Credits	1
Total Hours	30
Hours per Week	2
Course Type	Value Added Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	
Course Offered to	Physics
Regulation	2023
Course Overview	This course: a. Trains a student to plan, rehearse and present technical and mathematical information to an audience of their peers b. Provides students with an avenue to express technical information in an academic or professional environment. c. Trains students to comport themselves vocally and physically while presenting in front of an audience. d. Teaches students the use of digital aids such as slideshow software and projectors for the use of dissemination of information.
Prerequisite	Students must be majoring in Physics. Students must have a reasonable command of English
Course Objectives	A student will be able to: i. Read and understand technical information from a paper, article or other specialized manuals. ii. Analyze and break down the given information and assimilate with pre-existing knowledge. iii. Construct and present technical knowledge to an audience of their peers in a clear and lucid manner. iv. Critically evaluate and argue for or against the thesis of the paper.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Describe the details of the paper being presented	R
CO2	Interpret the paper and relate it to their pre-existing knowledge	U
CO3	Present the knowledge in a clear and lucid manner to an audience of their peers	A1

CO4	Appraise and break down the information being presented.	A2
CO5	Critique and argue for or against the thesis of the paper.	E
CO6	Design and construct a presentation that disseminates knowledge from the paper to an audience.	C

Course Structure

Session Number	Content	Total Hours	COs	RBT
1	Hours 1 & 2: Introduction to the Course	**2**	**-**	**-**
2-8	Hour 1: Presentation by one 2nd year student Hour 2: Summarized report on the presentation	**14**	**1,2,4**	**R U A2 E**
9	Hour 1: Demo presentation by faculty Hour 2: Report on demo presentation	**2**	**1,2,4**	**R U A2 E**
10-15	Hour 1: Presentation by 1st year student Hour 2: Summarized report on the presentation	**12**	**1,3,4, 5,6**	**R A1 A2 E C**

Learning Resources:
None

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment

The student **must** score a minimum of 40% of the total maximum marks assigned to the entire paper to pass the course, subject to the following restrictions: (i) the student **must** make a presentation of their own and submit the report of the same assessment, and (ii) the student should have a **minimum** of 75% attendance for the entire course.

Formative Assessment: The Formative Assessment will be of 50 marks and will be based on their individual presentations. This grade will then be converted out of 20.

Summative Assessment:The Summative Assessment will consist of a written report by the student for each presentation that they attend. Each report will be graded out of 10 and finally converted to a fraction of 25 marks.

Sl. No.	Category	Score
1	Organization	15
2	Content Knowledge	25

3	Style	5
4	Delivery	5
	Total	50

Evaluation Scheme of the entire Course

Component	Marks	Final Weightage	Final Marks
Summative Assessment	10 times the number of reports	variable	25
Formative Assessment	50	40%	20
Attendance	5	100%	5
		Total	50

Prepared by:	Checked and verified by:	Approved by:	External Experts - Board of Studies
(Signature) Mr. Bikramjit Chandra	(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

The curriculum document for the Department of Physics have been carefully examined and approved by the undersigned:

Checked and verified by:	**Approved by:**	**External Experts -** **Board of Studies**
(Signature) Dr. Prajwal Chettri Head of the Department	(Signature) Mr. Subhajit Paul Dean of Sciences	(Signature) Dr. Ranjan Sharma Associate Professor Department of Physics Coochbehar Panchanan Barma University (Signature) Dr. Amitabha Bhattacharyya Associate Professor Department of Physics Sikkim University Gangtok, Sikkim (Signature) Mr. Tamanash Das Supervisor (Retd.) Draughtsman Civil Trade ITI Tollygunge Kolkata (Signature) Mr. Aaush Pradhan (Alumnus) 2018 batch

SALESIAN COLLEGE (AUTONOMOUS)
SONADA-SILIGURI

Curriculum Structure
For

Bachelor of Computer Science (B. Sc CS)
And
Bachelor of Computer Applications (CSA) Programmes

(Basic and Honours Degree)

As per National Education Policy – 2020 guidelines

Department of Computer Science & Applications

First Revision - 2024

Table of Contents

Vision

Develop young men and women as technocrats, researchers and entrepreneurs in the field of Computer Science and Applications.

Mission

- To conduct and support undergraduate programmes of quality in Computer Science and Applications by means of better teaching-learning methodologies and value-added courses.
- To provide a foundation undergraduate programme which will act as a feeder course for higher studies in the area of Computer Science and Applications.
- To build leadership skills, ethical values and teamwork among the students.
- To provide knowledge and software development skills so students become employable to IT professional and service sectors
- To develop manpower that would provide technical and intellectual leadership to the community.
- To inculcate professional excellence by encouraging projects in industry relevant technologies and through industry interactions.
- To strengthen the collaboration of department and industry through internships, mentorships and professional body activities.
- To foster teaching, research and extension activities for the creation of new knowledge for the development of society.
- To cater to the holistic development of students, following the principles of Don Bosco Institution, so they become intellectually competent, socially sensitive, morally upright and emotionally balanced.

Program Outcomes

Degree holders possess knowledge of the relevant field or profession, such that they:	
KNOWLEDGE	**PO01**: have acquired general understanding and insight into main theories and concepts
	PO02: are aware of the latest knowledge in the relevant field
	PO03: can apply the basic elements of information technology
Degree holders can apply the methods and procedures of the field or profession, such that they:	
SKILLS	**PO04**: can use the relevant equipment, technology and software
	PO05: can apply critical analytic methods
	PO06: can rationalise their decisions
	PO07: can evaluate critically the methods applied
	PO08: recognise when further data is needed and have the ability to retrieve it, assess its reliability and apply it in an appropriate manner
	PO09: can use reliable data and information resources in the relevant scientific field
	PO10: have acquired an open-minded and innovative way of thinking
Degree holders can apply their knowledge and skills in a practical way in their profession and/or further studies, such that they:	
COMPETENCE	**PO11**: have developed the competences and independence needed for further studies within the field
	PO12: can work in an independent and organised manner, set goals for their work, devise a work schedule and follow it
	PO13: can participate actively and lead work groups
	PO14: are capable of interpreting and presenting scientific issues and research findings

Program Specific Outcomes

Degree holders possess knowledge of:		PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 01	PO 12	PO 13	PO 14
K N O W L E D G E	**PSO01**: A number of recurring themes, and a set of general principles that have broad application to the field of computer science	√													
	PSO02: The professional, legal, ethical, security, social and cultural issues and responsibilities inherent in the discipline of computing.	√													
	PSO03: The software systems are used in many different domains. This requires both computing skills and domain knowledge	√	√												
	PSO04: Software development fundamentals, including programming, data structures, algorithms and Complexity	√	√	√											
	PSO05: Systems fundamentals, including architectures and organization, operating systems, networking and communication, parallel and distributed computation, and security	√	√	√											
	PSO06: Mathematics fundamentals, including discrete structures, statistics and calculus	√	√	√											
	PSO07: Software engineering fundamentals, including software analysis and design, evaluation and testing, and software engineering processes	√	√	√											
	PSO08: Application fundamentals, including information management and intelligent applications	√	√	√											
	PSO09: Multiple programming languages, paradigms, and technologies	√	√	√											
Degree holders can apply the methods and procedures as follows:															
S K	**PSO10**: Know how to apply the knowledge they have gained to solve real issues as they will have the ability to analyse a problem, and identify and define the computing requirements				√			√		√					

I	[including mathematical] appropriate to its solution.														
L	**PSO11**: Realize that there are multiple solutions to a given problem and these solutions will have a real impact on people's lives						√								
L	**PSO12**: Communicate their solution to others, including why and how a solution solves the problem and what assumptions were made						√								
S	**PSO13**: Successfully apply the knowledge they have gained through project experience as they will have the ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.					√	√	√							
	PSO14: Encompass an appreciation for the structure of computer systems and the processes involved in their construction and analysis						√				√				
	PSO15: Understand individual and collective responsibility and individual limitations as well as the limitations of technical tools						√	√	√		√				
	PSO16: Understand the range of opportunities and limitations of computing										√				
Degree holders can apply their knowledge and skills, as follows:															
C	**PSO17**: Understand the multiple levels of detail and abstraction											√			
O	**PSO18**: Recognize the context in which a computer system may function, including its interactions with people and the physical world.											√			
M	**PSO19**: Able to communicate with, and learn from, experts from different domains throughout their careers											√			
P	**PSO20**: Possess a solid foundation that allows and encourages them to maintain relevant skills as the field evolves											√	√		
E	**PSO21**: To be able to manage their own career development and advancement											√			√
T	**PSO22**: Manage their own learning and development,												√		
E															
N															
C															
E															

	including managing time, priorities, and progress														
	PSO23: Have developed interpersonal communication skills as part of their project experience													√	
	PSO24: Work effectively both individually and as members of teams													√	
	PSO25: Make effective communication /presentations to a wide range of audiences about technical problems and their solutions													√	√
	PSO26: Encompass an appreciation of the interplay between theory and practice														√

Model Programme Structure for Bachelor of Computer Application (Basic/Honours) Programme

Sem.	Maor/Core 100 (Credit-4)	Minor/GE/ DSE 100 (Credit-4)	MD (Credit-3)	AECC		SEC-100 (Credit-3)/ Research Project/ Dissertation (Credit-12)	VOC/ Summer internship/ Apprenticeship-50 (Credit-4)	VAC 100 (Credit-4)	Semester Credit
				English-50 (Credit-4)	MIL-50 (Credit-4)				
1st Year									
I	Paper-1 Paper-2	Paper-I (Elective-1)	Introduction to MS Office (MD1)	English (Cr-2)		SEC-1		Understanding India/ VE	20
II	Paper-3 Paper-4	Paper-I (Elective-2)	Introduction to MS Office (MD2)		Vernacular / Alt English (Cr-2)	SEC-2	VOC/ Summer internship/ Apprenticeship	ENVS	21
*Exit option with Undergraduate Certificate in relevant Discipline on completion of 40 credits with 4 credits in **work based vocational course** offered during summer term or internship/ apprenticeship, in addition to 6 credits from skill-based courses earned during first and second semester.*									
2nd Year									
III	Paper-5 Paper-6	Paper-II (Elective-1)	Advanced Excel (MD3)	English (Cr-2)		SEC-3		Desktop Publishing	20
IV	Paper-7 Paper-8 Paper-9	Paper-II (Elective-2)			Vernacular / Alt English (Cr-2)		VOC/ Summer internship/ Apprenticeship		22
*Exit option with Undergraduate Diploma in relevant Discipline on completion of 80 credits with 4 credits in **skill based vocational course** offered during first or second year summer term.*									
3rd Year									
V	Paper-10 Paper-11 Paper-12	Paper-III (Elective-1) & DSE-1					VOC (Soft skills & Personality Development)		22
VI	Paper-13 Paper-14 Paper-15	Paper-III (Elective-2) & DSE-2					VOC/ Summer internship/ Apprenticeship		20
*Exit option with Bachelor's degree in relevant discipline on securing 120 credits. 4 credits in **vocational course** offered during first or second year summer term.*									
4th Year									
VII	Paper-16, Paper-17	Paper-IV (Elective-1), DSE-3, DSE-4 (Mini Project)							20
	Paper-16, Paper-17	Paper-IV (Elective-1I)				Research Methodologies			
VIII	Paper-18, Paper-19, Paper-20	Paper-V (Elective-1), DSE-5 (Project)							20
	Paper-18, Paper-19	Paper-V (Elective-1I)				Research Project/ Dissertation (Major course based)			20
Students will be awarded Undergraduate (Bachelor's) Honours Degree (with/ without Research) in relevant Discipline									

Question pattern for End-Semester Exam

<Department> (Honours / Program)

Pattern for 50 marks question paper:

Group A (10 marks) – 5 out of 8 questions, each of 2 marks

Group B (20 marks) – 4 out of 6 questions, each of 5 marks

Group C (20 marks) – 2 out of 4 questions, each of 10 marks

PAPER CODE /TITLE:

SEMESTER: **YEAR:**

FULL MARKS: 50

ASSESSMENT TYPE: End Semester Examination (Summative) **S:** Short (2mks); **M:** Medium (5mks); **L:** Long (10mks)

QUESTION TYPE: Mixed **(**Subjective & Objective)

WEIGHTAGE: As per MHRD guideline

BLUEPRINT (COGNITIVE DOMAIN)

20% **35%** **25%** ←---------- **20%** ---------→

Topic	Instructional Objectives	Reference		Remembering			Understanding			Applying			Analyzing			Evaluating			Creating			Total Marks	Actual Percentage
		W %	Marks	S	M	L	S	M	L	S	M	L	S	M	L	S	M	L	S	M	L		
Unit 1:																							
Unit 2:																							
Unit 3:																							
Unit 4:																							
Unit 5:																							
Unit 6:																							
Unit 7:																							
Total marks																							
Actual Percentage																							

Assessment/ Evaluation scheme for Theory based subjects

Level	Bloom's Taxonomy Level	Continuous Internal Assessment (50% weightage)						Final Examination (50% weightage)	
		CIA-1 (10%)		CIA-2 (15%)		CIA-3 (20%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
1	Remember Understand	60%		40%		30%		30%	
2	Apply Analyse	40%		40%		40%		40%	
3	Evaluate Create			20%		30%		30%	
Total		100%		100%		100%		100%	

CIA – 3 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Attendance – 5 marks

Assessment/ Evaluation scheme for Practical/ LAB based subjects

Level	Bloom's Taxonomy Level	Continuous Internal Assessment (50% weightage)						Final Examination (50% weightage)	
		CIA-1 (10%)		CIA-2 (15%)		CIA-3 (20%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
1	Remember Understand	30%	30%	20%	20%	15%	15%	15%	15%
2	Apply Analyse	20%	20%	20%	20%	20%	20%	20%	20%
3	Evaluate Create			10%	10%	15%	15%	15%	15%
Total		100%		100%		100%		100%	

CIA–3 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Attendance – 5 marks

Assessment/ Evaluation Scheme for Lab Examination

Internal		Final Examination	
Assessment Criteria	Marks	Assessment Criteria	Marks
Attendance	5	Flowchart / Algorithm	10
Task completion	35	Program code	15
Practical Record	10	Execution and Formatting	15
		Viva voce	10
Total	50	Total	50

Possible streams after two years

Code	Description
S1	Full Stack Development
S2	Data Science
S3	Artificial Intelligence & Machine Learning
S4	Cyber Security
S5	Physical Computing

FIRST YEAR

Semester I

Course Type	Code	Title of Paper	Maximum Marks			Credits Allotted				Weekly Hours
			CIA	ESE	Total	L	T	P	C	
AECC-1		English	50	50	100	2			2	2
VAC	Two to be taken up by student	VE	25	25	50	1			1	1
		ENVS	25	25	50				1	1
Core/ Major - 1	23CSAMAJ101	Programming in C	50	50	100	3			3	3
	23CSAMAJ101L	Programming in C Lab	50	50	100			2	1	2
Core/ Major - 2	23CSAMAJ102	Digital Electronics	50	50	100	3	0	0	3	3
		Digital Electronics Lab	50	50	100			2	1	2
GE/ Minor-1	23XXXMIN10X	One from following: • Mathematics • Statistics • Physics • Commerce • Economics • Management • Mass Communications & Journalism • Geography	50	50	100	4	1	0	4	4
Multi-Disciplinary - 1	23CSAMDC101	Introduction to MS Word, Excel and PowerPoint	50	50	100	2	0		2	2
	23CSAMDC101	Introduction to MS Word, Excel and PowerPoint Lab	50	50	100			2	1	2
SEC (Siliguri)	23CSASEC101A	Introduction to Cyber Security	50	50	100	2			2	2
	23CSASEC101AL	Introduction to Cyber Security	50	50	100			2	1	2
SEC (Sonada)	23CSASEC101B	Introduction to Office Tools	50	50	100	2			2	2
	23CSASEC101BL	Introduction to Office Tools Lab	50	50	100			2	1	2
				Total					23	26

Semester II

Course Type	Code	Title of Paper	Maximum Marks			Credits Allotted				Weekly Hours
			CIA	ESE	Total	L	T	P	C	
AECC-2		Vernacular/ Alt English	50	50	100	2			2	2
VAC	Two to be taken up by student	VE	25	25	50	1			1	2
		ENVS	25	25	50	1			1	
VOC		Summer internship/ Apprenticeship on vocational course						4	4	40
Core/ Major - 3	23CSAMAJ103	Object Oriented Programming with Java	50	50	100	3			3	3
	23CSAMAJ103L	Object Oriented Programming with Java Lab	50	50	100			2	1	2
Core/ Major - 4	23CSAMAJ104	Computer Organisation &Architecture	50	50	100	3			3	3
	23CSAMAJ104L	Computer Organisation &Architecture Lab	50	50	100			2	1	2
GE/ Minor-2	23STSMIN10X Or 23MATMIN10X	Paper-I of second minor (Statistics)	50	50	100	4	1	0	4	5
Multi-Disciplinary - 2	23COMOEL101	Accounting and Finance	50	50	100	3	0	0	3	4
SEC	23CSASEC102	Python Programming	50	50	100	2			2	2
	23CSASEC102L	Python Programming Lab	50	50	100			2	1	2
Total									22 (26)	27

SECOND YEAR

Semester III

Course Type	Code	Title of Paper	Maximum Marks			Credits Allotted				Weekly Hours
			CIA	ESE	Total	L	T	P	C	
AECC-1		English	50	50	100	2			2	2
VAC	Tow to be taken by student	NCC/NSS/Sports/Cultural etc	25	25	50				1	?
			25	25	50				1	
Core/ Major – 3	23CSAMAJ201	Data Structures	50	50	100	3			3	3
	23CSAMAJ201L	Data Structures LAB	50	50	100			2	1	2
Core/ Major - 4	23CSAMAJ202	Operating Systems	50	50	100	3			3	3
	23CSAMAJ202L	Operating Systems Lab	50	50	100			2	1	2
GE/ Minor-1	23XXXMIN20X	Paper-II of previously chosen GE-1	50	50	100	4	0	0	4	4
Multi-Disciplinary - 3	23CSAMDC201	Advanced Excel	50	50	100	3	0	0	3	3
SEC-A	23CSASEC201A	Introduction to Web Technology (HTML, JavaScript & PHP)	50	50	100	2			2	2
	23CSASEC201AL	Introduction to Web Technology (HTML, JavaScript & PHP) Lab	50	50	100			2	1	2
SEC-B	23CSASEC201B	Introduction to Web Technology (Java Technology)	50	50	100	2			2	2
	23CSASEC201BL	Introduction to Web Technology (Java Technology) Lab	50	50	100			2	1	2
				Total					22	25

Semester IV

Course Type	Code	Title of Paper	Maximum Marks			Credits Allotted				Weekly Hours
			CIA	ESE	Total	L	T	P	C	
AECC-2		Vernacular/ Alt English	50	50	100	2			2	2
VAC	Tow to be taken by student	NCC/NSS/Sports/Cultural etc	25	25	50				1	2
			25	25	50				1	
VOC		Summer internship/ Apprenticeship on vocational course						4	4	
Core/ Major–5	23CSAMAJ203A	Graphics programming using OpenGL	50	50	100	3			3	3
	23CSAMAJ203AL	Graphics programming Lab	50	50	100			2	1	2
	23CSAMAJ203B	Programming with Python and ML libraries	50	50	100	3			3	3
	23CSAMAJ203BL	Programming with Python and ML libraries Lab	50	50	100			2	1	2
Core/ Major-6	23CSAMAJ204	Software Engineering	50	50	100	3			3	3
	23CSAMAJ204L	Software Engineering Lab	50	50	100			2	1	2
Core/ Major-7	23CSAMAJ205	Database Management Systems	50	50	100	3			3	3
	23CSAMAJ205L	Database Management Systems Lab	50	50	100			2	1	2
GE/ Minor-2	23STSMIN30X	Paper-II of previously chosen GE-2	50	50	100	4	1	0	4	5
		Total							20 (24)	24

SEMESTER - I

Course 23CSAMAJ101

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ101	Programming in C	3		45	2
23CSAMAJ101L	Programming in C Lab		1	30	2

Course Objectives:
This course is designed to give an introduction to programming and provide a comprehensive study of the C programming language.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ101_1	Understand the basic concepts in computer programming e.g., procedural language, algorithm, flowchart, compiler, assembler, linker etc.
CO_CSAMAJ101_2	Write, compile and debug programs in C language.
CO_CSAMAJ101_3	Use different data types in a computer program.
CO_CSAMAJ101_4	Design programs involving decision structures, loops and functions.
CO_CSAMAJ101_5	Understand the dynamics of memory by the use of pointers.
CO_CSAMAJ101_6	Use different data structures and create/update basic data files.
CO_CSAMAJ101_7	Explain the difference between call by value and call by reference

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										
7																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction to C** (a) History of C (b) Overview of Procedural Programming (c) Introduction to Algorithm & Flowcharts	6	CO_CSAMAJ101_1	R, U, A1
Unit-2	**Compilation and Execution in C** (a) Using Basic Header Files (stdio.h, conio.h, etc) (b) Using main() function (c) Compiling and Executing Simple Programs in C	6	CO_CSAMAJ101_1 CO_CSAMAJ101_2	R, U, A1
Unit-3	**Data Types, Variables, Constants, Operators and Basic I/O**	7	CO_CSAMAJ101_1 CO_CSAMAJ101_2	R, U, A1

	(a) Declaring, Defining and Initializing Variables (b) Scope of Variables (c) Using Named Constants, Keywords, Comments (d) Data Types, Casting of Data Types (e) Operators (Arithmetic, Logical and Bitwise) (f) Character I/O (getc, getchar, putc, putcharetc) (g) Formatted and Console I/O (printf(), scanf(), cin, cout)		CO_CSAMAJ101_3	
Unit-4	**Expressions, Conditional Statements and Iterative Statements** (a) Simple Expressions in C (including Unary Operator Expressions, Binary Operator Expressions) (b) Operators Precedence in Expressions (c) Conditional Statements (if construct, switch-case construct) (d) Syntax and utility of Iterative Statements (while, do-while, and for loops) (e) Use of break and continue statements in loops (f) Nested Statements (Conditional as well as Iterative)	7	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4	R, U, A1, A2
Unit-5	**Functions** (a) Utility of functions (b) Call by Value (c) Call by Reference (d) Return data type of functions (e) Inline Functions (f) Parameters (g) Differentiating between Declaration and Definition of Functions (h) Command Line Arguments/Parameters in Functions (i) Variable number of Arguments	6	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_7	R, U, A1, A2
Unit-6	**Arrays and Strings** (a) One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, accessing individual elements in an Array, manipulating array elements using loops) (b) Use of various types of arrays (integer, float and character arrays / Strings) (c) Two-dimensional Arrays (Declaring, Defining and Initializing Two-Dimensional Array, Working with Rows and Columns) (d) Introduction to Multi-dimensional arrays	6	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_7	R, U, A1, A2
Unit-7	**User-defined Data Types (Structures and Unions)** (a) Understanding utility of structures and unions (b) Declaring, initializing and using simple structures and unions (c) Manipulating individual members of structures and unions (d) Array of Structures, Individual data members as structures (e) Passing and returning structures from functions	4	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_6 CO_CSAMAJ101_7	R, U, A1, A2, E, C

	(f) Structure with union as members, Union with structures as members.			
Unit-8	**Pointers and References in C** (a) Understanding a Pointer Variable (b) Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables) (c) Pointers to Pointers, Pointers to structures (d) Passing pointers as function arguments (e) Returning a pointer from a function (f) Using arrays as pointers, Passing arrays to functions (g) Pointers vs. References (h) Declaring and initializing references (i) Using references as function arguments and function return values	8	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_5 CO_CSAMAJ101_6 CO_CSAMAJ101_7	R, U, A1, A2, E, C
Unit-9	**Memory Allocation in C** (a) Differentiating between static and dynamic memory allocation (b) Use of malloc, calloc and free functions (c) Storage of variables in static and dynamic memory allocation	3	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_5 CO_CSAMAJ101_6 CO_CSAMAJ101_7	R, U, A1, A2, E
Unit-10	**File I/O** (a) Opening and closing a file (b) Reading and writing Text Files [Using put(), get(), read() and write() functions] (c) Random access files	4	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_5 CO_CSAMAJ101_6	R, U, A1, A2, E, C
Unit-11	**Pre-processor Directives** (a) Understanding the Pre-processor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef) (b) Macros	3	CO_CSAMAJ101_1 CO_CSAMAJ101_2	R, U, A1, C

Suggested Readings

1."The C Programming Language ANSI C Version", Kernighan & Ritchie, Prentice Hall Software Series.
2. "ANSI C - Made Easy", Herbert Schildt, Osborne McGraw-Hill.
3. "Learning to Program in C", N. Kantaris, Babani.
4. "C - The Complete Reference", Herbert Schildt, Osborne McGraw-Hill.
5. "Programming in C", Reema Thareja, Oxford University Press.

Practical (Laboratory)

CSAMAJ101L: Programming in C Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. WAP to perform input/output of all basic data types.
2. WAP to enter two numbers and find their sum.
3. WAP to reverse a number.
4. WAP to Swap Two Numbers.
5. WAP to Check Whether a Number is Even or Odd
6. WAP to compute the factors of a given number.
7. WAP to enter marks of five subjects and calculate total, average and percentage.
8. WAP to print the sum and product of digits of an integer.
9. WAP to Check Whether a Character is Vowel or Consonant

10. WAP to Find the Largest Number Among Three Numbers
11. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5…….
12. WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……
13. WAP to print figures as follow:

*	1	1	1
**	1 1	2 3	1 2
***	1 2 1	4 5 6	1 2 3
****	1 3 3 1	7 8 9 10	1 2 3 4
*****	1 4 6 4 1	11 12 13 14	1 2 3 4 5

* * * * * * *	A	A
* *	A B	B A
* *	A B C	C B A
* *	A B C D	D C B A
* *	A B C D E	E D C B A
* * * * * * *	A B C D E F	F E D C B A

14. WAP to perform following actions on an array entered by the user:
a) Print the even-valued elements
b) Print the odd-valued elements
c) Calculate and print the sum and average of the elements of array
d) Print the maximum and minimum element of array
e) Remove the duplicates from the array
f) Print the array in reverse order
The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
15. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
16. Write a program that swaps two numbers using pointers.
17. Write a program in which a function is passed address of two variables and then alter its contents.
18. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
19. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using **malloc**() / **calloc**() functions or **new** operator.
20. Write a menu driven program to perform following operations on strings:
21. Show address of each character in string
22. Concatenate two strings without using **strcat** function.
23. Concatenate two strings using **strcat** function.
24. Compare two strings
25. Calculate length of the string (use pointers)
26. Convert all lowercase characters to uppercase
27. Convert all uppercase characters to lowercase
28. Calculate number of vowels
29. Reverse the string
30. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
31. WAP to display Fibonacci series
(i) using recursion, (ii) using iteration
32. WAP to calculate Factorial of a number
(i) using recursion, (ii) using iteration
33. WAP to calculate GCD of two numbers:
(i) with recursion (ii) without recursion.
34. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
    a) Sum b) Difference c) Product d) Transpose
35. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
36. Write a program to retrieve the student information from file created in previous question and print it in the following format:
Roll No. Name Marks

37. Copy the contents of one text file to another file, after removing all whitespaces.
38. WAP to write a sentence to a file.
39. WAP to read a line from a file and display it.
40. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
41. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAMAJ102

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ102	Digital Electronics	3		45	3
23CSAMAJ102L	Digital Electronics Lab		1	30	2

Course Objectives:
To introduce the concepts of digital electronics that is at the core of logical and arithmetic operations in a computer.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSAMAJ102_1	Understand the basic design of a computer, hardware and software components.
CO_CSAMAJ102_2	Understand the need of different number systems, conversion rules, encoding systems.
CO_CSAMAJ102_3	Understand the basics of gates, Boolean functions and their uses
CO_CSAMAJ102_4	Construct basic combinational circuits and verify their functionalities
CO_CSAMAJ102_5	Apply the design procedures to design basic sequential circuits
CO_CSAMAJ102_6	Design and evaluate a solution to a digital design problem

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Fundamentals of Computers** (a) Generation of Computers and Computer Languages, (b) Computer Systems, (c) Basic block Diagram, (d) Von- Neumann Architecture, (e) Types of Computers, (f) Hardware, Firmware, (g) I/O Devices, (h) Storage classifications, (i) Language translators.	15	CO_CSAMAJ102_1	R, U
Uint-2	**Number Systems & Arithmetic** (a) Number System: Positional, Binary, Octal, Decimal, Hexa-Decimal and their Representations. (b) Methods of conversion from one Base to another. (c) Binary Addition, Subtraction, Multiplication.	15	CO_CSAMAJ102_1 CO_CSAMAJ102_2	R, U, A1

	(d) Negative number representation: Sign magnitude, 1's, (f) 2's Complement. (e) Different coding schemes: BCD, EBCDIC, UNICODE, ASCII, GRAY, Excess-3 Codes. (f) Fixed and floating-point representation			
Uint-3	**Logic gates** (a) AND, OR, NOT Gates and their Truth Tables, NOR, NAND & XOR gates, (b) Boolean algebra: Basic Boolean Laws, De-Morgan's theorem, Boolean function and their truth tables, (c) MAP simplification, Minimization techniques, K-Map, (d) Sum of Product & Product of Sum, (e) Venn diagram.	15	CO_CSAMAJ102_1 CO_CSAMAJ102_2 CO_CSAMAJ102_3 CO_CSAMAJ102_4	R, U, A1, A2, E
Uint-4	**Circuits, Adders, Flip Flops, Registers etc.** (a) Combinational & Sequential circuits, (b) Half adder & Full adder, (c) BCD adder, (d) Full Subtractor, (e) Multiplexer, De-Multiplexer, Encoder, Decoder. (f) Flip-flops-RS, D, JK, T & Master-Slave flip-flops, (g) Counters, Shift registers	15	CO_CSAMAJ102_1 CO_CSAMAJ102_2 CO_CSAMAJ102_3 CO_CSAMAJ102_4 CO_CSAMAJ102_5 CO_CSAMAJ102_6	R, U, A1, A2, E, C

Suggested Readings

1. Rajaraman V. & Radhakrishnan, "An Introduction to Digital Computer Design", PHI.
2. Malvino & Leach, "Digital Principles & Applications", TMH.
3. S. Salivahanan, S. Arivazhagan, "Digital Circuits and Design", Oxford University Press

Practical (Laboratory)

CSAMAJ102L: Digital Electronics Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. Show the basic operations of AND, OR, and NOT gates.
2. Simplify the Boolean expression: $F=A'B+AB'+AB$.
3. Implement the following Boolean function using logic gates: $F=A\cdot B+\bar{C}$.
4. Design a half adder circuit using basic logic gates.
5. Draw the truth table and Karnaugh map for a 3-input XOR gate.
6. Implement a 4-to-1 multiplexer using basic logic gates.
7. Design a 3-bit binary up-counter using flip-flops.
8. Design a 4-bit shift register with serial input and parallel output.
9. Implement a T flip-flop using a D flip-flop.
10. Design a 4-bit binary comparator circuit.
11. Implement a 3-bit magnitude comparator using basic logic gates.
12. Design a 3-to-8 decoder with enable input.
13. Design a 4-to-1 multiplexer using 2-to-1 multiplexers.
14. Implement a 1-to-4 demultiplexer using basic logic gates.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:

(Seal) (Seal)

(College Seal)

SEMESTER - II

Course 23CSAMAJ103

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ103	Object Oriented Programming with Java	3		45	3
23CSAMAJ103L	Object Oriented Programming with Java Lab		1	30	2

Course Objectives:

- To introduce students to the Java programming language.
- To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections;
- To implement I/O functionality to read from and write to text files.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ103_1	Understand the principles and practices of object-oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
CO_CSAMAJ103_2	Implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
CO_CSAMAJ103_3	Demonstrate the principles of object-oriented programming.
CO_CSAMAJ103_4	Demonstrate the ability to use simple data structures like arrays in a Java program.
CO_CSAMAJ103_5	Understand the concept of package, interface, multithreading and File handling in java.
CO_CSAMAJ103_6	Ability to make use of members of classes found in the Java API (such as the Math class).

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels

Unit-1	**Introduction to Java** a. Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, b. Compiling and Executing a Java Program, c. Variables, Constants, Keywords, Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, d. Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, e. Java Methods - Defining, Scope, Passing and Returning Arguments, f. Type Conversion and Type and Checking, Built-in Java Class Methods),	6	CO_BCAMAJ103_1 CO_BCAMAJ103_2	R, U
Uint-2	**Arrays, Strings and I/O** a. Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, b. Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, c. String Buffer Classes. d. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.	8	CO_BCAMAJ103_1 CO_BCAMAJ103_2 CO_BCAMAJ103_4	R, U, A1
Uint-3	**Object-Oriented Programming Overview** a. Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, b. Class Constructors, Class Variables & Methods, Method Overloading, Objects as parameters, c. final classes, Object class, Garbage Collection.	7	CO_BCAMAJ103_1 CO_BCAMAJ103_2 CO_BCAMAJ103_3	R, U, A1, A2,
Uint-4	**Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata** a. Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), b. Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, c. Using Standard Java Packages (util, lang, io, net), d. Wrapper Classes, Autoboxing/Unboxing, e. Enumerations and Metadata.	14	CO_BCAMAJ103_1 CO_BCAMAJ103_2 CO_BCAMAJ103_3 CO_BCAMAJ103_5	R, U, A1, A2, E,
Uint-5	**Exception Handling, Threading, Networking and Database Connectivity** a. Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions b. Multithreading: Thread class & Runnable interface, creating single & multiple threads, Thread prioritization, synchronization & communication, suspending/resuming threads. c. Using java.net package, Overview of TCP/IP and Datagram programming. d. Accessing and manipulating databases using JDBC.	15	CO_BCAMAJ103_1 CO_BCAMAJ103_2 CO_BCAMAJ103_3 CO_BCAMAJ103_5	R, U, A1, A2, E, C

Uint-6	**Applets and Event Handling** a. Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. b. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. c. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. d. Overview of servlets.	15	CO_BCAMAJ103_1 CO_BCAMAJ103_2 CO_BCAMAJ103_3 CO_BCAMAJ103_6	R, U, A1, A2, E, C

Suggested Readings

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4/e, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, Gilad Bracha, Alex Buckley, "The Java Language Specification, Java SE (Java Series)", 8/e, Addison Wesley, 2014.
3. Joshua Bloch, "Effective Java" 2/e, Addison-Wesley, 2008.
4. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 1", 9/e, Prentice Hall, 2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9/e, Prentice Hall, 2013.
6. Bruce Eckel, "Thinking in Java", 3/e, PHI, 2002.
7. E. Balaguruswamy, "Programming with Java", 4/e, McGraw Hill.2009.
8. Paul Deitel, Harvey Deitel, "Java: How to Program", 10/e, Prentice Hall, 2011.
9. Bert Bates, Kathy Sierra, "Head First Java", Orielly Media Inc. 2/e, 2005.
10. "Object Oriented Programming through JAVA", P Radha Krishna, University Press.
11. David J. Eck, "Introduction to Programming Using Java", CreateSpace Independent Publishing Platform, 2009.
12. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2/e, 2004.
13. R. Nageswara, "Core Java: An Integrated Approach", Dreamtech Press.

Practical (Laboratory)

CSAMAJ103L: Programming in JAVA Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of **.length** in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and StringBuffer classs like setCharAt(), setLength(), append(), insert(), concat() and equals().
9. Write a program to create a "distance" class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
10. Modify the "distance" class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions (from lower to higher data type)

12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.
15. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.
17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages
18. Write a program "DivideByZero" that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
19. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
21. Write a program to demonstrate priorities among multiple threads.
22. Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
23. Write a program to create URL object, create a URL Connection using the openConnection() method and then use it examine the different components of the URL and content.
24. Write a program to implement a simple datagram client and server in which a message that is typed into the server window is sent to the client side where it is displayed.
25. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet's window.
26. Write a program to get the URL/location of code (i.e. java code) and document (i.e. html file).
27. Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
28. Write a program to demonstrate different keyboard handling events.
29. Write a program to generate a window without an applet window using main() function.
30. Write a program to demonstrate the use of push buttons

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAMAJ104

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ104	Computer System Architecture	3		45	3
23CSAMAJ104L	Computer System Architecture LAB		1	30	2

Course Objectives:
The course covers the basic principles of computer organization and architecture.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ104_1	Be familiar with the building blocks of modern computers
CO_CSAMAJ104_2	Understand binary, octal and hexadecimal number systems
CO_CSAMAJ104_3	Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
CO_CSAMAJ104_4	Understand the principles and the implementation of computer arithmetic using digital logic.
CO_CSAMAJ104_5	Understand memory organisation

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy
Unit – I	**Data representation** a) Number Systems & Complements b) Fixed-point, floating-point and character representation c) Addition, subtraction, magnitude comparison, multiplication and division algorithms for integers.	6	CO_ BCAMJ104_1 CO_ BCAMJ104_2	R, U, A1,
Unit-2	**Memory and I/O Unit** a) Memory hierarchy b) Main memory c) Cache, Auxiliary and associative memory d) Input / Output: External Devices e) I/O Modules : Interfaces o Programmed I/O o Interrupt-Driven I/O	6	CO_ BCAMJ104_5, CO_ BCAMJ104_1	R, U

	○ Direct Memory Access, I/O Channels.			
Unit-3	**Overview of register transfer and micro operations** a) Register Transfer Language, Register transfer. b) Bus and Memory transfer c) Arithmetic, Logic & Shift Micro-operations. d) Arithmetic Logic Shift Unit.	8	CO_ BCAMJ104_3	R, U, A1
Unit-4	**Basic Computer Organization and Design** a) Instruction codes, Computer registers b) Computer instructions. c) Timing and Control, Instruction cycle. d) Register, I/O, Memory-Reference Instructions e) Input-output and interrupt. f) Design of Basic computer, Design of Accumulator Unit	8	CO_ BCAMJ104_2, CO_ BCAMJ104_1	R, U, A1, A2
Unit-5	**Central Processing Unit** a) Introduction, General Register Organization, Stack Organization b) Instruction format. c) Addressing Modes d) Data transfer and manipulation e) Program Control, Reduced Instruction Set Computer (RISC).	6	CO_ BCAMJ104_4	R, U, A1, A2
Unit -6	**Pipeline and Parallel Processing** a) Parallel Processing b) Pipelining c) Arithmetic Pipeline d) Instruction Pipeline **e)** RISC Pipeline	6	CO_ BCAMJ104_4	R, U, A1, A2

Suggested Readings

1. M. Mano, “Computer System Architecture”, Pearson Education 1992.
2. A. J. Dos Reis, “Assembly Language and Computer Architecture using C++ and JAVA”, Course Technology, 2004.
3. W. Stallings, “Computer Organization and Architecture - Designing for Performance”, 8/e, Prentice Hall of India, 2009.
4. M.M. Mano, “Digital Design”, Pearson Education Asia, 2013.
5. Carl Hamacher, “Computer Organization”, 5/e, McGraw Hill, 2012.

Practical (Laboratory)

CSAMAJ104L: Computer System Architecture Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. General study of Basic & Universal gates
a) AND b) OR c) NOT d) NOR
e) NAND f) XOR g) XNOR
2. Simple Boolean Expression using Basic gates and Universal gates:
$\overline{A}$. (B+A) + $\overline{B}$.A
3. Design Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor Circuit.
4. Parallel Adder (2-bit, 3-bit) Circuit.
5. Implement logic functions in SOP form using Multiplexer.
6. Implement De-multiplexer.
7. Implement 7- Segment Display with Decoder.
8. Implement Parity Generator (Odd & Even)
9. Implement Magnitude Comparator (1-bit, 2-bit, 3-bit)
10. Circuit Design and implementation of Flip-Flops (SR, JK, D) using ICs
11. Circuit design and implementation of Decoder (2x4) and Encoder (4x2) using ICs

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSASEC101

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSASEC101A	Introduction to Cyber Security	2		30	2
23CSASEC101AL	Introduction to Cyber Security Lab		1	30	2

Course Objectives:

- Learn the foundations of Cyber security and threat landscape.
- To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.
- To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of cyber security.
- To expose students to responsible use of online social media networks.
- To systematically educate the necessity to understand the impact of cybercrimes and threats with solutions in a global and societal context.
- To select suitable ethical principles and commit to professional responsibilities and human values and contribute value and wealth for the benefit of the society.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSASEC101_1	Understand the cyber security threat landscape.
CO_CSASEC101_2	Develop a deeper understanding and familiarity with various types of cyber-attacks, cybercrimes, vulnerabilities and remedies thereto.
CO_CSASEC101_3	Analyse and evaluate existing legal framework and laws on cyber security.
CO_CSASEC101_4	Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.
CO_CSASEC101_5	Analyse and evaluate the importance of personal data its privacy and security.
CO_CSASEC101_6	Analyse and evaluate the security aspects of social media platforms and ethical aspects associated with use of social media.
CO_CSASEC101_7	Analyse and evaluate the cyber security risks.
CO_CSASEC101_8	Evaluate and communicate the human role in security systems with an emphasis o n ethics, social engineering vulnerabilities and training.
CO_CSASEC101_9	Increase awareness about cyber-attack vectors and safety against cyber-frauds.
CO_CSASEC101_10	Take measures for self-cyber-protection as well as societal cyber-protection.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										
7																										

8																								
9																								
10																								

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction to Cyber Security** a) Defining Cyberspace and Overview of Computer and Web-technology b) Architecture of cyberspace c) Communication and web technology d) Internet infrastructure for data transfer and governance e) Regulation of cyberspace f) Concept of cyber security g) Issues and challenges of cyber security	6	CO_CSASEC101_1	R, U, A1
Unit-2	**Cyber Crime and Cyber Law** (a) Classification of cyber crimes (b) Common cyber crimes (c) Cybercriminals modus-operandi (d) Reporting of cyber crimes (e) Remedial and mitigation measures (f) Legal perspective of cyber crime 1. IT Act 2000 and its amendments 2. Cybercrime and offences (g) Organisations dealing with Cybercrime and Cyber security in India	6	CO_CSASEC101_1 CO_CSASEC101_2	R, U, A1
Unit-3	**Social media Overview and Security** (a) Introduction to Social networks (b) Types of Social media (c) Social media platforms (d) Social media monitoring (e) Hashtag (f) Social media marketing (g) Social media privacy (h) Challenges, opportunities and pitfalls in online social network (i) Security issues related to social media (j) Flagging and reporting of inappropriate content (k) Laws regarding posting of inappropriate content (l) Best practices for the use of Social media	7	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3	R, U, A1
Unit-4	**E-Commerce and Digital Payments** (a) Definition of E- Commerce (b) Components of E-Commerce (c) Elements of E-Commerce security (d) E-Commerce threats (e) E-Commerce security best practices (f) Introduction to digital payments (g) Components of digital payment and stake holders (h) Modes of digital payments 1. Banking Cards	7	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4	R, U, A1, A2

	2. Unified Payment Interface (UPI) 3. e-Wallets 4. Unstructured Supplementary Service Data (USSD) 5. Aadhar enabled payments (i) Digital payments related common frauds and preventive measures (j) RBI guidelines on digital payments and customer protection in unauthorised banking transactions (k) Relevant provisions of Payment Settlement Act,2007			
Unit-5	**Digital Devices Security, Tools and Technologies for Cyber Security** (a) End Point device and Mobile phone security (b) Password policy (c) Security patch management (d) Data backup (e) Downloading and management of third-party software (f) Device security policy (g) Cyber Security best practices 1. Significance of host firewall and Anti-virus 2. Management of host firewall and Anti-virus 3. Wi-Fi security 4. Configuration of basic security policy and permissions	6	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_7	R, U, A1, A2

References

1. Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001)
4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
7. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

Practical (Laboratory)

CSASEC101AL: Introduction to Cyber Security Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Unit-2	1. Checklist for reporting cybercrime at Cybercrime Police Station. 2. Checklist for reporting cybercrime online. 3. Reporting phishing emails. 4. Demonstration of email phishing attack and preventive measures.
Unit-3	1. Basic checklist, privacy and security settings for popular Social media platforms. 2. Reporting and redressal mechanism for violations and misuse of Social media platforms.
Unit-4	1. Configuring security settings in Mobile Wallets and UPIs. 2. Checklist for secure net banking.

Unit-5	1. Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User). 2. Setting and configuring two factor authentications in the Mobile phone. 3. Security patch management and updates in Computer and Mobiles. 4. Managing Application permissions in Mobile phone. 5. Installation and configuration of computer Anti-virus. 6. Installation and configuration of Computer Host Firewall. 7. Wi-Fi security management in computer and mobile.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSASEC101B

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSASEC101B	Introduction to Office tools	2		30	2
23CSASEC101BL	Introduction to Office tools Lab		1	30	2

Course Objectives:

In this comprehensive course, participants will develop a solid command over fundamental office tools, enabling them to enhance their productivity, streamline tasks, and communicate effectively in a modern workplace.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSASEC102 _1	Develop a strong foundation in using Word for various document creation and formatting tasks. They will be equipped to create professional-looking documents, collaborate effectively, and automate processes using features and tools within Microsoft Word.
CO_CSASEC102 _2	Develop the skills needed to create visually stunning, engaging, and effective presentations. They will be equipped to convey information with clarity, captivate audiences through multimedia integration, and confidently deliver impactful presentations for various settings and purposes.
CO_CSASEC102_3	Possess a solid understanding of essential Excel functions and features. They will be able to efficiently manage and format data, perform basic calculations, and create simple charts and tables. Participants will gain the foundational skills necessary to use Microsoft Excel for various personal and professional tasks.
CO_CSASEC102_4	Overall, participants will emerge from this unit with a well-rounded proficiency in Microsoft Excel's data management and calculation capabilities. They will be equipped to create and manage structured data tables, perform various calculations using functions, and organize worksheets effectively for both analysis and presentation purposes.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1	√		√					√			√	√		√					√							
2	√		√	√				√		√	√	√		√					√					√	√	√
3	√		√	√	√			√		√	√	√	√						√			√		√	√	√
4	√		√	√	√			√		√	√	√	√						√			√		√	√	√

Unit	Contents	Hours	Outcomes	Bloom's Revised Taxonomy Levels
Unit-1	**Introduction to Microsoft Word** (a) Overview of the Word interface and navigation, Creating and saving documents, Understanding the Ribbon and Quick Access Toolbar, Customizing the Word environment. (b) **Text Formatting and Styling:** Applying font styles, sizes, and colors, Paragraph formatting (alignment, spacing, indentation), Creating bulleted and numbered lists, Using styles and themes for consistent formatting. (c) **Document Layout and Page Setup:** Setting page margins, orientation, and size, Headers and footers for document branding, Inserting page breaks and section breaks, Creating and formatting tables for data presentation. (d) **Document Organization and Navigation:** Inserting and formatting page numbers, Inserting images, shapes, and SmartArt graphics, Wrapping text around objects, Adding and formatting text boxes, Embedding and linking multimedia element. (e) **Mail Merge and Automation**	9	CO_BCA SEC102 _1	R, U, A1
Unit-2	**Introduction to Microsoft PowerPoint** (a) Overview of the PowerPoint interface and navigation, Creating and saving presentations, Understanding the Slide Master and layout options, Customizing the PowerPoint environment. (b) **Slide Design and Layout:** Choosing and customizing slide layouts, Applying themes and color schemes, Adding and formatting text boxes and placeholders, Working with shapes and lines for visual impact. (c) **Adding Visual Elements:** Adding audio and video clips to slides, Adjusting multimedia playback options, Using animations and	8	CO_BCA SEC102_2	R, U, A1, A2

	transitions for engagement, Creating interactive buttons and hyperlinks. (d) **Advanced Slide Techniques:** Applying slide transitions and animations, Timing animations and slide transitions, Customizing motion paths for objects, Creating interactive quizzes and surveys (e) **Slide Show Customization:** Setting up and configuring slide show settings, Applying all learned concepts to create a comprehensive presentation.			
Unit-3	**Introduction to Microsoft Excel** (a) Overview of Excel interface and workbook navigation, Understanding rows, columns, and cells, Entering and editing data in cells, Formatting cells for text, numbers, and dates. (b) **Basic Formulas and Functions:** Introduction to basic formulas (addition, subtraction, multiplication, division), Using AutoSum for quick calculations, Applying built-in functions (SUM, AVERAGE, COUNT), Copying and pasting formulas and functions. (c) **Cell References and Relative/Absolute Values:** Understanding cell references (relative, absolute, mixed), Working with absolute and relative values in formulas, Using cell references in basic calculations, Applying formulas across multiple cells. (d) **Data Management and Formatting:** Sorting data in ascending and descending order. (e) **Introduction to Charts and Graphs:** Creating basic charts (column, line, pie), Formatting chart elements (titles, axes, data labels), Customizing chart styles and colors, Adding charts to worksheets and resizing.	8	CO_BCA SEC102_3 CO_BCA SEC102_4	R, U, A1, A2
Unit-4	**Working with Microsoft Excel** (a) **Working with Tables:** Creating tables for efficient data management, Sorting and filtering data within tables, Adding and removing rows and columns, Formatting tables for visual appeal. (b) **Perform Calculations with Functions:** Creating Simple Formulas, Setting up your own formula, Date and Time Functions, Financial Functions, Logical Functions, Functions Mathematical Functions. (c) **Worksheet Organization and Printing:** Inserting and deleting worksheets, Renaming and color-coding worksheets, Adjusting page setup and print options, Printing worksheets and workbooks.	5	CO_BCA SEC102_3 CO_BCA SEC102_4	R, U, A1, A2

Suggested Readings

1. Joan Lambert, Curtis Frye. *Microsoft Office 2016 Step by Step.*
2. Nancy Conner, Matthew MacDonald. *Microsoft Office 2016: The Missing Manual.*
3. K. Murali Kumar. *Microsoft Office 2019: A Quick and Easy Guide*.
4. Dr. S. Anbazhagan and S. Paneerselvam. *Microsoft Office 365: A Complete Guide*.

Practical (Laboratory)

CSASEC101BL: Introduction to Office Tools Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Word	1. Change the font style and size in a Word document 2. Apply bold, italic, and underline formatting to text 3. Create bulleted and numbered lists 4. Set margins and adjust page orientation in Word 5. Insert headers and footers into a document 6. Add page numbers to a document 7. Insert a table into a Word document 8. Merge and split cells in a table 9. Apply borders and shading to table cells 10. Insert images and shapes into a Word document 11. Add hyperlinks to text in a document 12. Embed a spreadsheet or chart into a Word document
Excel	1. Enter data into cells in Excel 2. Perform basic arithmetic operations (addition, subtraction, multiplication, division) in Excel 3. Use autofill to quickly fill a series of cells with data 4. Use the SUM function to add a range of cells 5. Use the IF function to create conditional statements in Excel 6. Apply number formatting (currency, percentage, etc.) to cells in Excel 7. Format cells to display dates and times 8. Apply cell styles and themes to a worksheet 9. Create a chart or graph in Excel 10. Customize the appearance of a chart (titles, axis labels, etc.) 11. Add trendlines or error bars to a chart
PowerPoint	1. Create a new presentation in PowerPoint 2. Add slides to a presentation and choose different layouts 3. Rearrange the order of slides in a presentation 4. Apply a theme to a PowerPoint presentation 5. Change the background colour or image of a slide 6. Apply text formatting (font size, colour, etc.) to slide titles and bullet points 7. Insert images or videos into a PowerPoint presentation 8. Add animations and transitions between slides 9. Embed audio files or add narration to a presentation 10. Start a slideshow from the beginning or from the current slide 11. Use presenter view to view presenter notes while presenting 12. Set up slide timings or record a narration for a slideshow

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:

(Seal) (Seal)

(College Seal)

Course 23CSASEC103

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSASEC103	Python Programming	2		30	2
23CSASEC103L	Python Programming Lab		1	30	2

Course Overview:
A core Python programming course typically provides a comprehensive introduction to the Python programming language, catering to both beginners and individuals with prior programming experience. The course aims to teach the fundamental concepts, syntax, and techniques required to write efficient and functional Python code.

Course Objectives:
The objectives of a core Python programming course are to equip students with a strong foundation in the Python programming language.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSASE103_1	**Basic Proficiency:** • Write, execute, and understand basic Python programs using appropriate syntax and semantics. • Demonstrate a clear understanding of Python's data types, including numbers, strings, lists, tuples, and dictionaries.
CO_CSASE103_2	**Control Flow and Looping:** • Implement conditional statements (if, elif, else) to control program flow. • Use loops (for and while) to iterate through sequences and perform repetitive tasks.
CO_CSASE103_3	**Function Implementation:** • Define functions with parameters and return values. • Utilize function abstraction for modular and reusable code.
CO_CSASE103_4	**Data Manipulation:** • Effectively manipulate strings and perform operations on lists, tuples, and dictionaries. • Utilize list comprehensions for concise data transformations.
CO_CSASE103_5	**Preparation for Advanced Learning:** • Lay a strong foundation for further exploration of advanced Python topics, such as web development, data science, and machine learning.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										

Units	Content	Lecture Hours	COs	RBT
Unit-1	**Unit-1: Components, control structures, functions.**	20		R, U

	Components: Python Interpreter/Shell, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() function and Is operator, Dynamic and Strongly Typed Language; *Control Flow Statements*: The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements; *Functions*: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Life time of Variables, Default Parameters, Command Line Arguments; *Strings*: Creating and Storing Strings, Basic String operations, Accessing Characters in String by Index Number, String Slicing and Joining, String methods			
Unit-2	*Lists*: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement, *Dictionaries*: Creating Dictionary, Accessing and modifying key:value pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary methods, The del Statement. *Tuples and Sets*: Creating tuples, basic tuple operations, indexing and slicing in tuples, built-in functions used on tuples, relations between tuples and lists, relations between tuples and dictionaries, tuple methods, using zip() function, *Sets*: Set Methods, Frozen set.	20		R, U, A1
Unit-3	*Files*: Types of files, creating and reading text data, file methods to read and write data, reading and writing binary files, the Pickle module, reading and writing CSV files, *Object-oriented programming*: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The constructor method, classes with multiple objects, class attributes versus data attributes; encapsulation, inheritance, polymorphism.	20		U, A1, E

Text Books:

1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372. [Unit I&II- 2,3,4,5,6,7,8,9 Unit III-11,12].

2. Eric Matthes, “Python Crash Course- A Hands-On, Project-Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.[Unit III-15, Unit IV-16]

3. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2016. [Unit IV-2,5].

Reference Books:

1. Kamthane, A. N., & Kamthane, A.A. , “Programming and Problem Solving with Python”, McGraw Hill Education, 2017.
2. Mark Lutz, “Learning Python”, 5th edition, Orelly Publication, 2013, ISBN 978- 1449355739.
3. Ljubomir Perkovic, “Introduction to Computing Using Python- An Application Development Focus”, Wiley,2012.

Practical (Laboratory)

CSASEC103L: Python Programming Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Unit-1	1. Write a Python script that prints "Hello, World!" to the console. 2. Create a program that takes two numbers as input from the user and prints their sum. 3. Write a program to calculate the area of a rectangle given its length and width. 4. Write a Python script that demonstrates the use of different data types (integers, floats, strings, booleans). 5. Create a program that swaps the values of two variables without using a temporary variable. 6. Write a program that converts temperature from Celsius to Fahrenheit. 7. Write a Python script that checks whether a number is positive, negative, or zero. 8. Create a program that determines if a given year is a leap year or not. 9. Write a program that compares three numbers and prints the largest one. 10. Write a Python script that prints all the even numbers from 1 to 20 using a for loop. 11. Create a program that calculates the factorial of a number using a while loop. 12. Write a program that prompts the user for a number and prints its multiplication table. 13. Create a program that checks if a given word is a palindrome or not. 14. Write a Python function to calculate the area of a circle given its radius. 15. Create a function that checks if a number is prime or not. 16. Write a program that uses a function to calculate the factorial of a number.
Unit-2	1. Write a Python script that demonstrates basic list operations (creation, accessing elements, appending, slicing). 2. Write a program that sorts a list of numbers in ascending order. 3. Create a dictionary representing a person with keys for "name", "age", and "city". Print each key-value pair. 4. Write a program that takes a dictionary as input and prints all keys and their corresponding values. 5. Add a new key-value pair to an existing dictionary. 6. Write a program that removes a key from a dictionary if it exists, and prints the updated dictionary. 7. Iterate over a dictionary and print only the keys. 8. Write a program that updates the values of a dictionary based on user input. 9. Create a tuple containing the days of the week. Print the third day of the week. 10. Write a program that unpacks a tuple into multiple variables and prints them. 11. Concatenate two tuples and print the result. 12. Write a program that converts a tuple into a list. 13. Iterate over a tuple and print each element. 14. Write a program that checks if a given element exists in a tuple. 15. Create two sets of numbers and find their union, intersection, and difference.

	16. Write a program that checks if a given element exists in a set. 17. Add an element to a set and print the updated set. 18. Remove an element from a set and print the updated set. 19. Iterate over a set and print each element. 20. Write a program that removes duplicate elements from a list and converts it into a set. 21. Write a program that checks if one set is a subset or superset of another set. 22. Write a program that finds the symmetric difference between two sets.
Unit-3	1. Write a Python script that reads a text file and counts the number of lines. 2. Create a program that reads a CSV file and prints its contents. 3. Write a program that writes data to a text file and reads it back. 4. Create a class called **Car** with attributes **make**, **model**, and **year**. Include a method **get_info()** that prints the car's information. 5. Create an object of the **Car** class and call the **get_info()** method. 6. Modify the **Car** class to include an **__init__()** method that initializes the attributes. 7. Create multiple objects of the **Car** class with different attributes. 8. Add a class variable **num_cars** to the **Car** class that keeps track of the number of cars created. 9. Include a class method **display_num_cars()** that prints the total number of cars. 10. Create a class **ElectricCar** that inherits from the **Car** class. Add an additional attribute **battery_size**. 11. Override the **get_info()** method in the **ElectricCar** class to include battery information. 12. Create a class **HybridCar** that inherits from both the **Car** and **ElectricCar** classes. Add an additional attribute **gas_tank_size**. 13. Override the **get_info()** method in the **HybridCar** class to include both battery and gas tank information. 14. Modify the **Car** class to make the **make**, **model**, and **year** attributes private. 15. Include getter and setter methods to access and modify these private attributes. 16. Create a class **Truck** that inherits from the **Car** class. Override the **get_info()** method to include additional information specific to trucks. 17. Overload the **+** operator for the **Car** class to combine two cars into a new object with combined attributes. 18. Create an abstract base class called **Vehicle** with abstract methods **start()** and **stop()**. 19. Implement the **Vehicle** class in the **Car**, **ElectricCar**, and **HybridCar** classes.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAVAC101

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAVAC101	Website Designing using WordPress		1	30	2

Course Overview:
This course introduces:

a. A comprehensive introduction to WordPress, one of the most popular content management systems (CMS) for website development.
b. Students will learn how to create, customize, and manage websites using WordPress.
c. Students will be able to build and maintain functional and visually appealing websites for personal blogs, portfolios, small businesses, and more.

Course Objectives:
To enable a student to:

- Understand the basics of WordPress and its role in website development.
- Create and set up a WordPress website from scratch.
- Customize website appearance using themes and templates.
- Add and manage content, including text, images, and multimedia.
- Troubleshoot common issues and perform website maintenance.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSAVAC101_1	Enumerate key features and basics of WordPress
CO_CSAVAC101_2	Understand the structure of a website and the importance of tools.
CO_CSAVAC101_3	Classify plugins and tools for content management and optimization.
CO_CSAVAC101_4	Create a simple website or blog.
CO_CSAVAC101_5	Optimize and enhance website security
CO_CSAVAC101_6	Create and Set Up a WordPress Website

Units	Content	Lecture Hours	COs	RBT
Unit-1	**Introduction to WordPress** a. CMS and its uses b. WordPress- Advantages & Disadvantages c. Creating a Blog website on wordpress.org, installation on localhost and FTP d. Choosing and installing WordPress themes. e. Customizing website appearance through theme settings. f. Creating custom menus and navigation. g. Working with widgets and sidebars. h. Creating and formatting posts and pages. i. Inserting images, videos, and other media. j. Organizing content using categories and tags. k. Managing comments and discussions.	15	CO1 CO2 CO3 CO4	R U A1 A2
Unit-2	**Optimization, Maintenance & Security** a. Optimizing content for search engines. b. Improving website performance and load times. c. Ensuring responsive design for various devices. d. Creating user accounts and assigning roles. e. Setting up user permissions and access levels.	15	CO4 CO5 CO6	A1 A2 E C

	f. Implementing basic security measures. g. Identifying and resolving common WordPress issues. h. Backing up and updating the website. i. Regular maintenance tasks for a healthy website. j. Create a 4-page website			

Learning Resources:

Open online resources

1. https://www.tutorialspoint.com/wordpress/wordpress_tutorial.pdf

Practical (Laboratory)

CSAVAC101: Website designing using WordPress **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

1. Install WordPress on a web server.
2. Difference between WordPress.com and WordPress.org.
3. Create a local development environment for WordPress using tools like XAMPP or WAMP.
4. Choose a WordPress theme for a website.
5. Customize a WordPress theme to fit specific design requirements.
6. Create a new page in WordPress.
7. Differentiate between pages and posts in WordPress.
8. Add multimedia content (images, videos) to a page or post.
9. Create and customize navigation menus in WordPress.
10. Explain the concept of parent and child menu items in WordPress.
11. Add custom links to a WordPress menu.
12. Add widgets to the sidebar or footer of a WordPress website.
13. State the purpose of common WordPress widgets like Recent Posts, Categories, and Search.
14. Create custom widgets or modify existing ones.
15. Install and activate plugins in WordPress.
16. Explain the purpose of popular WordPress plugins such as Yoast SEO, Contact Form 7, and WooCommerce.
17. Troubleshoot plugin conflicts in WordPress.
18. Describe the benefits of using page builder plugins like Elementor or Beaver Builder in WordPress.
19. Create custom layouts and designs using a page builder.
20. Integrate custom CSS or JavaScript code into a WordPress website built with a page builder.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAVAC102

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAVAC102	Graphics Designing		1	30	2

Course Objectives:

The objective of this Graphic Designing (Basic) course is to provide students with a comprehensive introduction to the fundamental principles and techniques of graphic design. Through a balanced blend of theoretical instruction and practical hands-on exercises, students will develop a strong foundation in design concepts, software proficiency, and creative problem-solving skills. By the conclusion of the course, students will be equipped to produce visually appealing and effective designs tailored for both print and digital media. The course aims to enable students to:

- Understand the pivotal role and significance of graphic design in various industries and contexts.
- Comprehend and apply key elements and principles of design, such as line, shape, colour, texture, balance, and contrast, to create visually engaging compositions.
- Familiarize themselves with essential design software, including Adobe Photoshop and Illustrator, to execute design tasks efficiently.
- Demonstrate practical skills through hands-on exercises, culminating in the creation of a basic digital artwork that incorporates fundamental design elements.
- Develop a solid grasp of typography fundamentals, encompassing typefaces, fonts, hierarchy, kerning, and leading, and effectively apply them in layout design.
- Apply principles of effective layout design to craft visually compelling posters, integrating typography and layout techniques learned during the course.
- Gain proficiency in image editing and manipulation, including image resolution, file formats, colour modes, cropping, retouching, and colour adjustments using Photoshop tools.
- Enhance a photograph through practical application of image editing techniques, showcasing an understanding of digital image enhancement.
- Cultivate skills in designing for digital media, producing web graphics and social media posts that communicate effectively in the digital realm.
- Explore the realm of vector graphics and logo design, acquiring a foundational understanding of logo creation.
- Successfully conceive, design, and execute a final project consisting of a simple logo and business card, applying learned design principles and software skills.
- Present and articulate their final design projects, engage in constructive critique, and evaluate design choices effectively.
- By achieving these objectives, students will be well-prepared to embark on their graphic design journey, equipped with a strong foundation that supports further exploration and advancement in the field.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSAVAC102_1	A comprehensive understanding of the fundamental concepts that underpin the world of graphic design. They will appreciate the pivotal role that graphic design plays in shaping visual communication across various industries and contexts. Students will be adept at identifying and applying essential design elements and principles, including line, shape, colour, texture, balance, and contrast, to create visually captivating compositions. By successfully completing this module, students will have established a strong foundation in graphic design, enabling them to approach design tasks with a critical eye and an informed perspective. They will be equipped to analyze visual compositions, comprehend the interplay of design elements, and initiate their creative journey in the realm of graphic design.
CO_CSAVAC102_2	Developed a comprehensive understanding of the art and science of typography, as well as the principles governing effective layout design. Students will possess the

	ability to discern and select appropriate typefaces and fonts based on design objectives, and they will have a keen grasp of establishing visual hierarchy through techniques such as kerning and leading. The students will be adept at applying the principles of effective layout design, employing concepts such as alignment, proximity, contrast, and balance to create visually harmonious and compelling compositions. Through hands-on experience, students will have honed their skills by designing a poster that emphasizes the integration of typography and layout elements.
CO_CSAVAC102_3	Developed a proficient skill set in image editing techniques and manipulation, enabling them to effectively enhance and transform digital images. Students will have gained a solid understanding of key technical aspects, including image resolution, file formats, and colour modes, allowing them to make informed decisions when working with visual content. By successfully completing this module, students will possess the practical skills needed to manipulate digital images with precision and creativity. They will be equipped to make visual improvements to photographs, create visually appealing compositions, and effectively convey desired moods and messages through image manipulation. This proficiency in image editing will serve as a valuable asset in various design projects and provide students with a strong foundation for further exploration in the realm of graphic design.
CO_CSAVAC102_4	Acquired the essential skills to excel in the realm of digital design. They will be adept at crafting impactful visuals tailored for digital media, including web graphics and social media posts, effectively engaging audiences in the digital landscape. The students will have a foundational understanding of vector graphics and logo design principles, empowering them to create distinctive and versatile visual identities. Through hands-on experience, students will have successfully conceptualized, designed, and executed a simple logo and business card, showcasing their ability to apply learned concepts to real-world design projects.

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction to Graphics Design** (a) Understanding the role and importance of graphic design (b) Elements and principles of design: line, shape, colour, texture, balance, contrast, etc. (c) Introduction to design software (e.g., Adobe Photoshop, Illustrator, InDesign) (d) Hands-on: Creating a simple digital artwork using basic design elements	6	CO_CSAVAC102_1	R, U, A1
Unit-2	**Typography and Layout Design** (a) Typography fundamentals: typefaces, fonts, hierarchy, kerning, leading (b) Principles of effective layout design (c) Hands-on: Designing a poster with emphasis on typography and layout	8	CO_CSAVAC102_2	R, U, A1
Unit-3	**Image Editing and Manipulation** (a) Introduction to image resolution, file formats, and colour modes (b) Basic image editing techniques: cropping, retouching, colour adjustments (c) Hands-on: Enhancing a photograph using Photoshop tools	10	CO_CSAVAC102_3	R, U, A1
Unit-4	**Digital Design**	6	CO_CSAVAC102_4	R, U, A1

	(a) Designing for digital media: web graphics, social media posts (b) Introduction to vector graphics and logo design			

Recommended Resources:

1. Ellen Lupton. *Thinking with Type*.
2. Williams, Robin. *The Non-Designer's Design Book*.
3. Dabner, David., Stewart, Sandra. and Vickress, Abbie. *Graphic Design School: The Principles and Practice of Graphic Design*.
4. Adobe Creative Cloud Tutorials and Documentation

Websites and Blogs:

Smashing Magazine: A great resource for design articles, tutorials, and inspiration.

Behance: A platform to showcase and discover creative work, offering inspiration and insights.

YouTube Channels:

The Futur: Offers insightful videos on design principles, typography, and more.

Tutpad: Provides a variety of graphic design tutorials for beginners.

Practical (Laboratory)

CSAVAC102: Graphics Design **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Photoshop	1. Crop an image in Photoshop. 2. Adjust brightness and contrast in Photoshop. 3. Use the clone stamp tool to remove unwanted elements from an image. 4. Use layers in Photoshop. 5. Create a new layer and apply blending modes. 6. Make a selection using the lasso tool in Photoshop. 7. Retouch blemishes in a portrait using the spot healing brush tool. 8. Use the dodge and burn tools to selectively lighten and darken areas of an image.
Illustrator	1. Create a rectangle and a circle in Illustrator. 2. Use the pen tool to draw custom shapes. 3. Apply stroke and fill colours to shapes in Illustrator. 4. Create and format text in Illustrator? 5. Difference between point text and area text. 6. Convert text to outlines in Illustrator. 7. Demonstrate use of artboards in Illustrator. 8. Organize artwork using layers in Illustrator. 9. Create a new layer and rearrange layers in the layer panel.
InDesign	1. How do you create a new document in InDesign? 2. Explain how to set up margins and columns for a document in InDesign. 3. Describe how to add pages to a document in InDesign. 4. How do you import text and images into an InDesign document? 5. Explain how to create text frames and link them together in InDesign. 6. Describe how to adjust image size and position within an InDesign document. 7. How do you create a grid layout for a magazine spread in InDesign? 8. Explain the process of aligning and distributing objects on a page in InDesign. 9. Describe how to apply colours, gradients, and effects to objects in InDesign. 10. How do you export an InDesign document to PDF format?

	11. Explain how to set up bleeds and crop marks for printing in InDesign. 12. Describe how to package an InDesign document to include all linked images and fonts.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAVAC201

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAVAC201	Desktop Publishing		1	30	2

Course Objectives:

This course offers students the chance to create a collection of publications suitable for inclusion in their portfolios. Participants will work with industry-standard page layout and graphics software, acquiring a comprehensive understanding of print production technology and processes. This includes learning how to effectively communicate with other print experts, estimate expenses, and manage digital output.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSAVAC201_1	Gain and employ the abilities to craft both fiction and non-fiction pieces, engage in professional editing, generate digital content, formulate print and web-based materials, and oversee the progression of writing and editing projects.
CO_CSAVAC201_2	Utilize theoretical and technical expertise in innovative ways to align with diverse readerships and markets, addressing their unique needs and expectations.

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction to DTP** (a) Preliminary understanding of DTP-related terms (b) Text and graphics formats (c) Difference between drawings and images (d) Image storage formats such as BMP, GIF, TIFF, and JPG/JPEG	4	CO_CSAVAC201_1	R, U, A1
Unit-2	**Adobe PageMaker Basics** (a) Workspace overview Preferences, menus, toolbox, palettes, converting documents from other programs, saving and closing documents, document pages, master pages, printing a document. (b) Working with Text Utilizing text in PageMaker, importing text, text frames, story editor, character formatting, paragraph formatting, type utilities, working with styles, editing existing styles, working with tables. (c) Working with objects Rectangles and ellipses, polygons, manipulating objects, filling and stroking objects. (d) Working with colour Colours palette, adding new colours, editing and deleting colours, verifying colour suitability for printing, trapping. (e) Working with images and graphics	12	CO_CSAVAC201_1 CO_CSAVAC201_2	R, U, A1

	Image/graphic file formats, image resolution, placing images, modifying images and graphics, working with frames, text wrap, image masks. (f) Exporting as HTML and PDF files Options for exporting, exporting pages, exporting PDF files.			
Unit-3	**CorelDraw** (a) Basics of CorelDraw Menus, expanded menus and dialog boxes, toolbars, property bar, status bar, toolbox, zoom tool (zooming in and out), pan tool, document viewing, desktop power tools, starting or opening documents, saving, importing, and exporting files. (b) Rectangles and Ellipses Paths, Objects, Properties, drawing rectangles, rounding rectangle corners, creating ellipses, transforming ellipses into a pie shape or arc. (c) Select, Move, and Size Selecting and deselecting objects, marquee selection, moving an object, copying and pasting objects, cloning objects, copying/moving an object between documents, handles and scaling, altering object dimensions. (d) Polygons, Stars, and Spirals Creating polygons; drawing stars; creating polygons as stars; Creating symmetrical spirals; drawing logarithmic spirals. (e) Nodes and Paths Adding, deleting, joining, and converting using various types of nodes. (f) Lines and Curves Freehand tool, Bezier tool, knife tool, eraser tool, artistic media tool. (g) Colour and Fills Closing object paths, filling with uniform colour, changing outline colour, eyedropper tool, paint bucket tool, interactive mesh fill tool. (h) Working with Text Adding artistic text and paragraph text, using handles, text formatting, flowing text between paragraph text frames, directing paragraph text onto a path and into an object, making text flow around an object, rotating text, free skew tool, interactive drop shadow tool, vector extrusions.	14	CO_CSAVAC201_1 CO_CSAVAC201_2	R, U, A1

Suggested Readings

1. Roger C. Parker and Kate Shoup. *Desktop Publishing & Design For Dummies*.
2. Deke McClelland and Mark Abdelnour. *CorelDRAW for Dummies.*

Practical (Laboratory)

CSAVAC201: Desktop publishing **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

PageMaker	1. Create a new document in Adobe PageMaker. 2. Setting up page size and orientation. 3. Specify margins and columns for a document in PageMaker. 4. Insert and format text in Adobe PageMaker. 5. Create text frames and link them together. 6. Apply paragraph and character styles to text. 7. Import images and graphics into a PageMaker document. 8. Resize and crop images within PageMaker. 9. Apply borders and effects to images. 10. Arrange and align objects on a PageMaker page. 11. Create master pages and apply them to document pages. 12. Use layers to organize elements within a PageMaker document.
CorelDraw	1. How do you create basic shapes such as rectangles, circles, and polygons in CorelDRAW? 2. Describe how to manipulate objects using the selection and transformation tools. 3. Explain how to apply fills and outlines to shapes in CorelDRAW. 4. How do you create and format text in CorelDRAW? 5. Describe how to convert text to curves for further manipulation. 6. Explain how to apply text effects such as drop shadows and outlines. 7. How do you import images into a CorelDRAW document? 8. Describe how to crop and resize images within CorelDRAW. 9. Explain how to apply effects and filters to images. 10. Describe the process of arranging and aligning objects on a CorelDRAW page. 11. Explain how to use layers to organize elements within a CorelDRAW document. 12. Describe how to create multiple pages and manage page layouts in CorelDRAW. 13. How do you export a CorelDRAW document to common file formats such as PDF or JPEG? 14. Describe how to set up bleeds and crop marks for printing in CorelDRAW. 15. Explain how to adjust colour settings for accurate printing.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAMDC101

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMDC101	Introduction to MS-Word, Excel and PowerPoint	2		30	2
23CSAMDC101L	Introduction to MS-Word, Excel and PowerPoint Lab		1	30	2

Course Overview:

This course introduces:

a. How to use MS Office applications use in office work such as creating professional-quality documents; store, organize and analyse information.
b. How to perform arithmetic operations and functions.
c. How to create dynamic slide presentations with animation, narration, images, and writing professional emails.

Course Objectives:

To enable a student to:

- Create digital documents of professional quality.
- Organize numerical and financial data for analysis
- Create dynamic presentations with animations
- Differentiate and decide type of document to be used for a given task.
- Write emails of professional quality.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will have or be able to
CO_CSAMDC101_1	List the uses and features of MS Word, Excel, PowerPoint
CO_CSAMDC101_2	Understand various text formatting techniques, including fonts, styles, sizes, and alignment.
CO_CSAMDC101_3	Build and manage spreadsheets for data entry, analysis, and organization.
CO_CSAMDC101_4	Apply Formatting techniques, tables, and charts to present data and information effectively.
CO_CSAMDC101_5	Design and create documents for a given event.
CO_CSAMDC101_6	Create documents of professional quality for business and academic purposes.

Units	Content	Lecture Hours	COs	RBT
Unit-1	**Introduction to MS Word** a. Creating, editing, saving and printing text documents b. Font and paragraph formatting c. Simple character formatting d. Inserting tables, smart art, page breaks e. Using lists and styles f. Working with images g. Using Spelling and Grammar check h. Understanding document properties i. Mail Merge	13	CO1 CO6	R U A1 A2 E C
Unit-2	**Introduction to MS Excel** a. Spreadsheet basics b. Creating, editing, saving and printing spreadsheets Working with functions & formulas	14	CO1 CO3 CO6	R U A1 A2 E

	c. Modifying worksheets with color & autoformats Graphically representing data: Charts & Graphs			C
Unit-3	**Introduction to MS PowerPoint** a. Opening, viewing, creating, and printing slides Applying auto layouts b. Adding custom animation c. Using slide transitions d. Graphically representing data: Charts & Graphs Creating Professional Slide for Presentation.	13	CO1 CO4 CO6	R U A1 A2 E C
Unit-4	**Internet & e-mails** a. What is Internet? b. Receiving Incoming, Messages Sending Outgoing Messages, c. Email addressing, Email attachments d. Browsing, Search engines	5	CO2 CO6	R U E C

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

Learning Resources:

Open online resources

1. https://support.microsoft.com/en-us/office/powerpoint-for-windows-training-40e8c930-cb0b-40d8-82c4-bd53d3398787
2. https://support.microsoft.com/en-us/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb
3. https://support.microsoft.com/en-us/office/word-for-windows-training-7bcd85e6-2c3d-4c3c-a2a5-5ed8847eae73

Practical (Laboratory)

CSAMDC101L: Introduction to MS-Word, Excel and PowerPoint Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Word	1. Change the font style and size in a Word document 2. Apply bold, italic, and underline formatting to text 3. Create bulleted and numbered lists 4. Set margins and adjust page orientation in Word 5. Insert headers and footers into a document 6. Add page numbers to a document 7. Insert a table into a Word document 8. Merge and split cells in a table 9. Apply borders and shading to table cells 10. Insert images and shapes into a Word document 11. Add hyperlinks to text in a document 12. Embed a spreadsheet or chart into a Word document
Excel	1. Enter data into cells in Excel 2. Perform basic arithmetic operations (addition, subtraction, multiplication, division) in Excel 3. Use autofill to quickly fill a series of cells with data 4. Use the SUM function to add a range of cells 5. Use the IF function to create conditional statements in Excel 6. Apply number formatting (currency, percentage, etc.) to cells in Excel 7. Format cells to display dates and times 8. Apply cell styles and themes to a worksheet 9. Create a chart or graph in Excel 10. Customize the appearance of a chart (titles, axis labels, etc.) 11. Add trendlines or error bars to a chart
PowerPoint	1. Create a new presentation in PowerPoint

	2. Add slides to a presentation and choose different layouts 3. Rearrange the order of slides in a presentation 4. Apply a theme to a PowerPoint presentation 5. Change the background colour or image of a slide 6. Apply text formatting (font size, colour, etc.) to slide titles and bullet points 7. Insert images or videos into a PowerPoint presentation 8. Add animations and transitions between slides 9. Embed audio files or add narration to a presentation 10. Start a slideshow from the beginning or from the current slide 11. Use presenter view to view presenter notes while presenting 12. Set up slide timings or record a narration for a slideshow
Email	1. Initiate a mail merge in Microsoft Word. 2. Connect a data source, such as an Excel spreadsheet, to a Word document for mail merge. 3. Insert merge fields into a Word document. 4. Format merge fields to display specific data types, such as dates or currency. 5. Preview individual merged documents in Microsoft Word. 6. Edit merge documents to ensure proper formatting and content. 7. Filter and sort data in the mail merge recipient list. 8. Explore options available for completing a mail merge, such as printing or sending emails. 9. Perform the actual merge to generate personalized documents for each recipient. 10. Troubleshoot common issues that may arise during the merge process.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

SEMESTER - III

Course 23CSAMAJ201

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ201	Data Structures	3		45	3
23CSAMAJ201L	Data Structures LAB		1	30	2

Course Objectives:

The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ201_1	Demonstrate familiarity with major algorithms and data structures.
CO_CSAMAJ201_2	Analyse performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.
CO_CSAMAJ201_3	Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.
CO_CSAMAJ201_4	Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.
CO_CSAMAJ201_5	Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Arrays** a) Single and Multi-dimensional Arrays, b) Sparse Matrices (Array and Linked Representation)	5		R, U, A1
Unit-2	**Stacks** (a) Implementing single / multiple stack/s in an Array (b) Prefix, Infix and Postfix expressions (c) Utility and conversion of these expressions from one to another (d) Applications of stack (e) Limitations of Array representation of stack	5		R, U, A1
Unit-3	**Linked Lists**	10	CO_CSAMAJ101_1 CO_CSAMAJ101_2	R, U, A1

	(a) Singly, Doubly and Circular Lists (Array and Linked representation) (b) Normal and Circular representation of Stack in Lists (c) Self-Organizing Lists (d) Skip Lists		CO_CSAMAJ101_3	
Unit-4	**Queues** (a) Array and Linked representation of Queue, De-queue, Priority Queues	5	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4	R, U, A1, A2
Unit-5	**Recursion** (a) Developing Recursive Definition of Simple Problems and their implementation (b) Advantages and Limitations of Recursion (c) Understanding what goes behind Recursion (Internal Stack Implementation)	5	CO_CSAMAJ101_1 CO_CSAMAJ101_2 CO_CSAMAJ101_3 CO_CSAMAJ101_4 CO_CSAMAJ101_7	R, U, A1, A2
Unit-6	**Trees** (a) Introduction to Tree as a data structure (b) Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals on Binary Search Trees) (c) Threaded Binary Trees (Insertion, Deletion, Traversals) (d) Height-Balanced Trees (Various operations on AVL Trees)	20		
Unit-7	**Searching and Sorting** (a) Linear Search (b) Binary Search (c) Comparison of Linear and Binary Search (d) Selection Sort (e) Insertion Sort (f) Merge Sort (g) Shell Sort (h) Comparison of Sorting Techniques	5		
Unit-8	**Hashing** (a) Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering (b) Resolving collusion by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, (c) Choosing a Hash Function, Perfect Hashing Function			

Suggested Readings

1. Adam Drozdek, "Data Structures and algorithm in C++", 3/e, Cengage Learning, 2012.
2. Sartaj Sahni, Data Structures, "Algorithms and applications in C++", 2/e, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidyah Langsam, "Data Structures Using C and C++", 2/e, PHI, 2009.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson, 1999.
5. D.S Malik, "Data Structure using C++", 2/e, Cengage Learning, 2010.
6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3/e, 2011
7. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidyah Langsam, "Data Structures Using Java", 2003.
8. Robert Lafore, "Data Structures and Algorithms in Java", 2/e, Pearson/ Macmillan Computer Pub, 2003.
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited, 2/e, 2009.

10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4/e, Wiley, 2013.
11. Herbert Schildt, "Java The Complete Reference (English) Paperback", 9/e, Tata McGraw Hill, 2014.
12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

Practical (Laboratory)

CSAMAJ201L: Data Structures Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomials.
11. WAP to calculate factorial and to compute the factors of a given no. (i) using recursion, (ii) using iteration
12. WAP to display Fibonacci series (i) using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 numbers
(i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree:
(i) Insertion (Recursive and Iterative Implementation)
(ii) Deletion by copying
(iii) Deletion by Merging
(iv) Search a no. in BST
(v) Display its preorder, postorder and inorder traversals Recursively
(vi) Display its preorder, postorder and inorder traversals Iteratively
(vii) Display its level-by-level traversals
(viii) Count the non-leaf nodes and leaf nodes
(ix) Display height of tree
(x) Create a mirror image of tree
(xi) Check whether two BSTs are equal or not
15. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
16. WAP to reverse the order of the elements in the stack using additional stack.
17. WAP to reverse the order of the elements in the stack using additional Queue.
18. WAP to implement Diagonal Matrix using one-dimensional array.
19. WAP to implement Lower Triangular Matrix using one-dimensional array.
20. WAP to implement Upper Triangular Matrix using one-dimensional array.
21. WAP to implement Symmetric Matrix using one-dimensional array.
22. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.
23. WAP to implement various operations on AVL Tree.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:

(Seal) (Seal)

(College Seal)

Course 23CSAMAJ202

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ202	Operating Systems	3		45	3
23CSAMAJ202L	Operating Systems LAB		1	30	2

Course Objectives:

The objective of the course is to provide basic knowledge of computer operating system structures and functioning.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ202_1	Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
CO_CSAMAJ202_2	Understand the difference between process & thread, issues of scheduling of user level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
CO_CSAMAJ202_3	Gain knowledge about the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
CO_CSAMAJ202_4	Demonstrate the design and management concepts along with issues and challenges of main memory, virtual memory and file system.
CO_CSAMAJ202_5	Understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction** a) Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems, time sharing systems b) Operating systems for personal computers & workstation`s, process control & real time systems	10		R, U, A1
Unit-2	**Operating System Organization** (a) Processor and user modes, kernels, system calls and system programs.	6		R, U, A1

Unit-3	**Process Management** (a) System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries (b) Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms (c) Concurrent and processes, critical section, semaphores, methods for inter-process communication (d) Deadlocks	20		R, U, A1
Unit-4	**Memory Management** (a) Physical and virtual address space (b) Memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory	10		R, U, A1, A2
Unit-5	**File and I/O Management** (a) Directory structure, file operations, file allocation methods, device management.	10		R, U, A1, A2
Unit-6	**Protection and Security** (a) Policy mechanism, Authentication, Internal access Authorization.	4		

Suggested Readings

1. A Silberschatz, P.B. Galvin, G. Gagne, "Operating Systems Concepts", 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, "Modern Operating Systems", 3/e, Pearson Education 2007.
3. G. Nutt, "Operating Systems: A Modern Perspective", 2/e, Pearson Education 1997.
4. W. Stallings, "Operating Systems, Internals & Design Principles", 5/e, Prentice Hall of India. 2008.
5. M. Milenkovic, "Operating Systems - Concepts and design", Tata McGraw Hill 1992.
6. "Operating Systems", A K Sharma, University Press.

Practical (Laboratory)

CSAMAJ202L: Operating Systems Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities: **[Implement the followings using Bash Shell Script]**

1. Evaluate : 1 * 2^3 + 2 * 4^3 + 3 * 6^3 +.... up to n terms
2. Evaluate : 1^2 + 3^2 + 6^2 + 10^2.... up to n terms
3. Evaluate : 1 * 3^2 + 2 * 5^2 + 3 * 7^2 +.... up to n terms
4. Evaluate : 1 - 2 + 3 - 4 +.... up to n terms
5. Print the following:

*	5 4 3 2 1	1	* * * * * *
**	4 3 2 1	1 2	*
***	3 2 1	1 2 3	* * * * *
****	2 1	1 2 3 4	* * * *
*****	1	1 2 3 4 5	* * *
			* *
			*

6. Find the factorial of a number.
7. Find HCF an LCM of 2/3 numbers.
8. Check whether a given year is leap year or not.
9. Find the sum of squares of the digits of a numbers.
10. Find the Armstrong numbers between 100 & 999.

11. Check whether a given number is prime or not.
12. Print all the prime numbers between 1 & 100.
13. Print the multiplication table of a number.
14. Check whether a number is perfect square or not.
15. Find the first and last digit of any number and find their product.
16. Find the Area of Circle, Rectangle, or Triangle using user-input.
17. Find the prime factors of a number.
18. Convert a decimal number to binary.
19. Convert a binary number to decimal.
20. Check whether a given string is palindrome or not.
21. Abbreviate a name.
22. Reverse a string.
23. Find the largest and smallest numbers from a list of 10 integers.
24. Find the numbers and their sums between 100 to 300 which are divisible by 3 and 7.
25. Calculate ${}^{n}_{r}C$ using function.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSASEC201A

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSASEC201A	Introduction to Web Technology (HTML, JavaScript & PHP)	2		30	3
23CSASEC201AL	Introduction to Web Technology (HTML, JavaScript & PHP) LAB		1	30	2

Course Overview:
This course introduces students to the understanding of web technology fundamentals and gives practical skills in HTML, JavaScript, and PHP programming for web development.

Course Objectives:
To enable a student to:

- Gain a foundational understanding of how the World Wide Web works, including client-server architecture, HTTP protocol, and web standards.
- Learn the basics of HTML and CSS
- Learn the basics of JavaScript as a client-side scripting language for adding interactivity and dynamic behaviour to web pages
- Learn basics of PHP (Hypertext Pre-processor) as a server-side scripting language for building dynamic web applications with its integration with web server.
- Integrate databases such as MySQL/MariaDB for dynamic content generation and data-driven web applications
- Make use of essential tools/ software used for web development

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSASEC201A_1	Explain how the World Wide Web works, including client-server architecture, HTTP protocol, and web standards
CO_CSASEC201A_2	Develop simple web pages/forms using HTML and CSS
CO_CSASEC201A_3	Make the web page/form interactive by the use of JavaScript
CO_CSASEC201A_4	Perform server-side scripting making use of web server
CO_CSASEC201A_5	Perform database integration and make the content data driven
CO_CSASEC201A_6	Use essential tools/ software used in web development (editing, debugging, testing etc)

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Web Basics and Overview** Introduction to: a) Internet, World Wide Web, Web Browsers, URL, MIME, HTTP b) Web Programmers Toolbox c) HTML Common tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. d) Java Script - Declaring variables, functions, Event handlers (onclick, onsubmit, etc.,) and Form Validation.	10		R, U, A1
Unit-2	a) **Introduction to XML**: • Document type definition • XML Schemas • Presenting XML • XHTML • Using XML Processors: DOM and SAX b) **PHP:** • Declaring Variables, • Data types, • Operators, • Control structures, • Functions.			
Unit-3	**Web Servers:** a) Handling Http Request & Responses b) Cookies and Session tracking.			
Unit-4	**Database Access:** a) Connecting to database in PHP, b) Execution of Simple Queries,			

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNITs 1, 2)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta, Pearson Education,2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia.
5. An Introduction to WEB Design and Programming –Wang-Thomson
6. PHP: The Complete Reference Steven Holzner TataMcGraw-Hill.

Practical (Laboratory)

CSASEC201AL: Introduction to Web Technology (HTML, JavaScript & PHP) Lab
[Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

1. Create an HTML document with the different formatting options i.e. Bold, Italics, Underline, Headings (Using H1 to H6 heading styles), Font (Type, Size and Colour), Background (Coloured background/Image in background), Paragraph, Line Break, Horizontal Rule, Pre tag
2. Create an HTML document which consists of: Ordered List, Unordered List, Nested ordered and/or unordered List and Image
3. Create an HTML document which implements Internal linking as well as External linking.
4. Create a table using HTML demonstrating use of columns and rows, merging multiple rows and/or columns etc. with data and image values and contents with hyperlinking
5. Create a typical student data capture form for the purpose of admission to your college using different types of HTML controls i.e. Text Box, Option/radio buttons, Check boxes, Reset and Submit buttons etc.
6. Create HTML documents having multiple frames in different possible formats/organization.
7. Information Structure: In this exercise, student will practice identifying the structure of an information object
8. Deconstructing an XML Document: In this exercise, student will practice identifying the explicit structure within an XML document. In a sense, this is the reverse of what you did in Exercise #7.
9. Creating XML Mark-up: In this exercise, create some XML mark-up based on the tree representation from previous exercise and the content from the original sample document.
10. Well-Formedness: This exercise checks your understanding of the constraints for well-formedness based on some sample code document to be provided by the concerned teacher. Are the supplied code document instances well-formed? Explain any NO answers.
11. Create a PHP page using functions for comparing three integers and print the largest number.
12. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
13. WAP to check whether the given number is prime or not.
14. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
15. Write a PHP function that checks if a string is all lower case.
16. Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
17. WAP to sort an array.
18. Write a PHP script that removes the whitespaces from a string. Sample string: 'The quick " " brown fox' Expected Output : Thequick""brownfox
19. Write a PHP script that finds out the sum of first n odd numbers.
20. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
21. Write a PHP script that checks if a string contains another string.
22. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.
23. Create a script to construct the following pattern, using nested for loop.

*
* *
* * *
* * * *

24. Write a simple PHP program to check that emails are valid.
25. WAP to print first n even numbers.
26. $color = array('white', 'green', 'red")
Write a PHP script which will display the colours in the following way
: Output:
white, green, red,
- green
- red
- white

27. Using switch case and dropdown list display a ―Hello‖ message depending on the language selected in drop down list.
28. Write a PHP program to print Fibonacci series using recursion.
29. Write a PHP script to replace the first 'the' of the following string with 'That'. Sample: 'the quick brown fox jumps over the lazy dog.'

Expected Result: That quick brown fox jumps over the lazy dog.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSASEC201B

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSASEC201B	Introduction to Web Technology (Java Technology)	2		30	3
23CSASEC201BL	Introduction to Web Technology (Java Technology) LAB		1	30	2

Course Overview:
This course introduces students to the understanding of web technology fundamentals including client-server architecture, HTTP protocol and web standards along the Java technology path.

Course Objectives:
To enable a student to:

- Gain a foundational understanding of how the World Wide Web works, including client-server architecture, HTTP protocol, and web standards.
- Learn the basics of HTML and CSS
- Learn the basics of JavaScript as a client-side scripting language for adding interactivity and dynamic behaviour to web pages
- Learn the basics of Servlets a Java-based technology for creating dynamic web content, including handling HTTP requests and responses, session management, and servlet lifecycle.
- Learn the basics of Java Server Pages (JSP) for creating dynamic web pages
- Integrate Java web applications with databases using JDBC

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSASEC201B_1	Explain how the World Wide Web works, including client-server architecture, HTTP protocol, and web standards
CO_CSASEC201B_2	Develop simple web pages/forms using HTML and CSS
CO_CSASEC201B_3	Make the web page/form interactive by the use of JavaScript
CO_CSASEC201B_4	Develop Servlets for server-side operations
CO_CSASEC201B_5	Develop JSP forms for dynamic data driven web pages.
CO_CSASEC201B_6	Perform database operations, including connecting to databases, executing SQL queries, and handling result sets.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels

Unit-1	**Web Basics and Overview** Introduction to: e) Internet, World Wide Web, Web Browsers, URL, MIME, HTTP f) Web Programmers Toolbox g) HTML Common tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. h) Java Script - Declaring variables, functions, Event handlers (onclick, onsubmit, etc.,) and Form Validation.	10		R, U, A1
Unit-2	c) **Introduction to XML**: • Document type definition • XML Schemas • Presenting XML • XHTML • Using XML Processors: DOM and SAX			
Unit-3	**Web Servers and Servlets:** c) Introduction to Servlets d) Lifecycle of a Servlet e) JSDK f) Deploying Servlet g) The Servlet API h) The javax Servlet Package i) Reading Servlet parameters j) Reading Initialization parameters k) The javax.servlet HTTP package l) Handling Http Request & Responses m) Cookies and Session tracking.			
Unit-4	**JSP Application Development:** a) The Anatomy of a JSP Page, b) JSP Processing. c) JSP Application Design and JSP environment d) JSP Declarations, Directives, Expressions, Scripting Elements, implicit objects			
Unit-5	**Database Access:** a) Database Programming using JDBC, JDBC drivers, b) Studying Javax.sql.* package c) Connecting to database in JSP d) Execution of Simple Queries e) Accessing a Database from a Servlet.			

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNITs 1, 2)
2. Core Servlets and Java Server Pages Volume 1: Core Technologies by Marty Hall and Larry Brown Pearson (Units 3, 4, 5)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta, Pearson Education,2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia.
3. Jakarta Struts Cookbook, Bill Siggelkow, SPD O' Reilly for chap8.
4. March's beginning JAVA JDK 5, Murach, SPD
5. An Introduction to WEB Design and Programming –Wang-Thomson

Practical (Laboratory)

CSASEC201BL: Introduction to Web Technology (Java Technology) Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Unit-1	1. Create an HTML document with the different formatting options i.e. Bold, Italics, Underline, Headings (Using H1 to H6 heading styles), Font (Type, Size and Colour), Background (Coloured background/Image in background), Paragraph, Line Break, Horizontal Rule, Pre tag 2. Create an HTML document which consists of: Ordered List, Unordered List, Nested ordered and/or unordered List and Image 3. Create an HTML document which implements Internal linking as well as External linking. 4. Create a table using HTML demonstrating use of columns and rows, merging multiple rows and/or columns etc. with data and image values and contents with hyperlinking 5. Create a typical student data capture form for the purpose of admission to your college using different types of HTML controls i.e. Text Box, Option/radio buttons, Check boxes, Reset and Submit buttons etc. 6. Create HTML documents having multiple frames in different possible formats/organization.
Unit-2	1. Deconstruct an XML Document: In this exercise, student will practice identifying the explicit structure within an XML document. 2. Create XML Mark-up: In this exercise, create some XML mark-up based on the tree representation from previous exercise and the content from the original sample document.
Unit-3	1. What is a servlet and how does it differ from other Java technologies for web development? 2. Describe the lifecycle of a servlet. 3. Create and configure a servlet in a Java web application. 4. Explain the concept of servlet mapping and how it is configured in a web.xml file. 5. Difference between URL patterns like exact match, prefix, and suffix mapping. 6. Map multiple servlets to different URL patterns in a web application. 7. Describe the role of HTTP methods such as GET, POST, PUT, DELETE in servlets. 8. Explain how to handle different types of HTTP requests in a servlet. 9. Retrieve request parameters and headers in a servlet. 10. What is session management in the context of web applications? 11. Describe the different ways to manage sessions in Java web applications. 12. Store and retrieve session attributes in servlets.
Unit-4	1. What is JavaServer Pages (JSP) and how does it relate to servlets? 2. Describe the structure of a JSP page and its lifecycle. 3. Embed Java code and expressions in a JSP page. 4. Print a table of numbers from 5 to 15 and their squares and cubes using alert. 5. Print the largest of three numbers. 6. Find the factorial of a number n. 7. Enter a list of positive numbers terminated by Zero. Find the sum and average of these number s. 8. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years. 9. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list. 10. Demonstrate use of JSP directives like page, include, and taglib. 11. Demonstrate use of common JSP actions such as forward, include. 12. Include external resources like CSS and JavaScript in a JSP page.
Unit-5	1. Connect to a database using JDBC from a JSP page. 2. Execute SQL queries and handle result sets in a servlet or JSP page.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSASEC202

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSASEC202	Introduction to R Programming	2		30	2
23CSASEC202L	Introduction to R Programming LAB		1	30	2

Course Overview:
This course introduces the R programming language, RStudio IDE, basic operations and functions, data import/export, data cleansing and manipulation and data visualization.

Course Objectives:
To enable a student to:

- Have familiarity of the programming language and the Integrated Development Environment.
- Import / export data available in various formats, into and out of the environment
- Perform basic cleansing of data and do basic manipulations of the same
- Perform basic analysis of data.
- Perform visualization of data and/or its analysis.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSASEC202_1	Setup the environment and manage its configuration
CO_CSASEC202_2	Write programs in R language
CO_CSASEC202_3	Import/ load data into the environment; export data out of the environment
CO_CSASEC202_4	Perform basic statistical analysis of data
CO_CSASEC202_5	Perform visualization of the data analysis

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction** (a) Understanding R (b) RStudio: Familiarize yourself with the RStudio IDE (Integrated Development Environment) and its features. (c) Simple Program: Learn how to write and execute basic R programs. (d) Variables: Concept of variables in R and how to assign and manipulate values.	10		R, U, A1
Unit-2	**Data types and Operators**:			

	(a) Data Types: Different data types in R, including numeric, character, and date. (b) Nchar: to determine the number of characters in a string. (c) Logical Operators: (e.g., AND, OR, NOT) in R. (d) Subset Data, Square Brackets, and Logic Statements (e) Logic Statements and cbind Command: cbind function to combine data frames.			
Unit-3	**Control statements**: (f) If Statement: for conditional execution of code. (g) If Else Statement: for multiple conditional branches. (h) For Loop: iterative execution of code. (i) While Loop: for repetitive execution of code until a condition is met.			
Unit-4	**Vector and Matrices**: (a) Vectors: working with vectors in R. (b) Explore advanced vector operations, such as vector indexing and subsetting (c) Getting Specific Items from a Vector (d) Matrix: Concept of a matrix. Create and manipulate matrices in R. (e) Explore advanced matrix operations, such as matrix transposition and multiplication.			
Unit-4	**Data Frames, Lists and File Operations**: (a) Data Frame: Working with data frames to store tabular data. (b) Additional techniques to manipulate and analyse data frames in R. (c) List: Create and manipulate lists in R. (d) Read CSV files: import data from CSV files into R. (e) Read text files: import data from text files into R.			
Unit-5	**Charts and Plots**: (a) Charts: Bar charts, pie charts, and scatter plots. (b) Mean, attach /detach, levels, and summary statistics in R. (c) Stacked Bar Charts and Clustered Bar Charts, Categorical data. (d) Scatter Plot, Relationships between two continuous variables.			

References:

Practical (Laboratory)

CSASEC202L: Introduction to R programming Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

1. Install R and RStudio on your system.

2. Demonstrate the key features of the RStudio interface.
3. Explain the difference between R scripts and R markdown documents.
4. Create a new R script in RStudio.
5. Install and load packages in R.
6. Import data into RStudio from external sources.
7. Perform basic data manipulation tasks such as subsetting and filtering in R.
8. Demonstrate the concept of vectors and how they are used in R.
9. Create basic plots in R using the base plotting system.
10. What are the advantages of using ggplot2 for data visualization in R?
11. Customize plots using ggplot2 syntax.
12. Export plots created in RStudio to external files.
13. Demonstrate usage of functions in R (By defining and using).
14. Demonstrate the concept of control structures (such as loops and conditional statements) in R programming.
15. Demonstrate handling of missing data in R.
16. Demonstrate some common methods for conducting descriptive statistics in R.
17. Demonstrate basic hypothesis testing in R.
18. Interpret the output of statistical tests conducted in R.
19. Describe some resources or methods for getting help with R programming when encountering difficulties.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

SEMESTER - IV

Course 23CSAMAJ203A

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ203A	Graphics programming with OpenGL	3		45	3
23CSAMAJ203AL	Graphics programming Lab		1	30	2

Course Objectives:

- **Understand Fundamental Concepts**
  Gain a deep understanding of fundamental graphics programming concepts, including rasterization, rendering pipeline, transformations, and shading techniques.

- **Learn OpenGL Architecture**
  Explore the architecture and functionality of OpenGL, including its core features, libraries, and extensions, to effectively leverage its capabilities in graphics programming.

- **Develop Proficiency in OpenGL Programming**
  Acquire proficiency in programming graphics applications using OpenGL APIs, including setting up a rendering context, managing buffers, and implementing shaders for rendering objects.

- **Explore 2D and 3D Graphics Rendering**
  Learn techniques for rendering both 2D and 3D graphics using OpenGL, including rendering primitives, textures, lighting, and implementing perspective transformations for realistic rendering.

- **Implement Interactive Graphics Applications**
  Learn to develop interactive graphics applications using OpenGL, including user input handling, camera control, and real-time rendering techniques to create immersive user experiences.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ203A_1	Acquire knowledge about different graphics systems and models, including raster and vector graphics, and understand their underlying principles.
CO_CSAMAJ203A_2	Have knowledge about OpenGL architecture
CO_CSAMAJ203A_3	Develop proficiency in graphics programming using OpenGL, including setting up the development environment and writing basic OpenGL code.
CO_CSAMAJ203A_4	Understand geometrical objects, transformations and viewing in both 2D and 3D spaces, including matrix representations and homogeneous coordinates, perspective and orthographic projections, and explore methods for hidden surface removal; illumination and shading techniques, including the use of light sources, surface detail, and material properties.
CO_CSAMAJ203A_5	Implement interactive Graphics applications

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										

3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									
13																									

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction** a) Motivation, Uses, History b) Graphics Systems and Models c) Graphics Programming: Getting started with OpenGL d) Input and Interaction in OpenGL.	5		R, U, A1
Unit-2	**Transformation, Viewing, Illumination and Shading** (a) Geometrical Objects and Transformations in 2D and 3D, homogeneous coordinates, matrix representation (b) windows and viewports (c) Viewing in 3D, projections, hidden surface removal; (d) Light, shading and materials. Illumination and Shading, light sources, (surface detail, ray tracing, radiosity)	7		R, U, A1
Unit-3	**Processing, shading** (a) From Vertices to Fragments: modelling, geometry processing, rasterization, fragment processing. (b) Clipping, hidden surface removal, antialiasing (c) Discrete techniques: buffers, bit and pixel operations, texture mapping, compositing (d) Programmable shaders: OpenGL shading language, fragment shaders, cub and bump maps.	20		R, U, A1
Unit-4	**Modelling and rendering** (a) Modelling Techniques, trees, scene graphs; (b) Curve and surface representation (c) Advanced rendering techniques: ray tracing, radiosity, image-based rendering.	15		R, U, A1, A2

Reference Books:

Edward Angel, Interactive Computer Graphics: A Top-Down Approach with OpenGL, 4th edition, Addison-Wesley, 2005.

Additional References:

1. Edward Angel, OpenGL: A primer, 2nd edition, Addison-Wesley, 2005
2. The OpenGL Programmer's Guide (the Redbook), Addison-Wesley
3. The OpenGL Reference Manual (the Bluebook), Addison-Wesley
4. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics : Principles & Practices, Addison Wesley Longman, 2nd edition in C, 1994
5. Donald Hearn, M. Pauline Baker, Computer Graphics, 2nd edition, C version, Prentice Hall, 1996.

Practical (Laboratory)

CSAMAJ203AL: Graphics programming Lab **[Credit: 1, Lab Hours: 30]**

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

1. Set up an OpenGL development environment on your system.
2. Describe the basic structure of an OpenGL program.
3. Illustrate vertices, edges, and polygons in OpenGL.
4. Explain the OpenGL rendering pipeline and its stages.
5. Specify geometric primitives in OpenGL?
6. Set up and manage a window for OpenGL rendering.
7. Demonstrate use of shaders in OpenGL in the rendering process.
8. Create and compile shaders in an OpenGL program.
9. Transform objects in 3D space using matrices in OpenGL.
10. Demonstrate the concept of camera transformations and how they are implemented in OpenGL.
11. Specify lighting and material properties in an OpenGL scene.
12. Explain the different types of shading models available in OpenGL (e.g., flat shading, Gouraud shading, Phong shading).
13. Describe the process of texture mapping in OpenGL.
14. Load and apply textures to objects in an OpenGL scene.
15. Demonstrate the use of framebuffer objects (FBOs) in advanced rendering techniques.
16. Explain the concept of vertex buffer objects (VBOs) and how they improve rendering performance in OpenGL.
17. Describe some common techniques for optimizing OpenGL rendering performance.
18. Handle user input (e.g., keyboard and mouse events) in an OpenGL application.
19. List some resources or methods for further learning and exploring advanced topics in OpenGL graphics programming.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAMAJ203B

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ203B	Programming with Python and ML libraries	3		45	3
23CSAMAJ203BL	Programming with Python and ML libraries Lab		1	30	2

Course Objectives:

The course aims to equip students with foundational Python skills, including control flow, data structure manipulation, object-oriented programming, file handling, and exception handling, to prepare them for practical application in various domains, including machine learning.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ203B_1	Understand the foundational knowledge in Python, including understanding its history, basic syntax, data structures, input/output operations, variables, and operators.
CO_CSAMAJ203B_2	Demonstrate proficiency in Python program flow, including indentation, conditional statements, looping, control statements, function implementation, parameter passing, and understanding of scope and namespaces.
CO_CSAMAJ203B_3	Work with various Python data structures including lists, tuples, dictionaries, and sets, as well as mastering string manipulation and list comprehensions for efficient data handling.
CO_CSAMAJ203B_4	Demonstrate mastery in defining and utilizing functions, understanding function arguments, handling global and local variables, and effectively importing and using modules in Python programming.
CO_CSAMAJ203B_5	Exhibit proficiency in object-oriented programming principles, including class and object creation, inheritance, polymorphism, encapsulation, and abstraction, along with familiarity with advanced concepts like decorators and magic methods.
CO_CSAMAJ203B_6	Showcase competence in file handling operations, including opening, reading, writing, and appending files, as well as adeptness in handling exceptions gracefully for writing robust and error-tolerant code.
CO_CSAMAJ203B_7	Understand some of popular Python libraries used in machine learning, enabling them to apply these libraries effectively in real-world data analysis and machine learning projects.

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										
7																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction** (a) History & features (b) Setting up path (c) Basic syntax, python data structures & (d) data types (e) Simple input & output variables & operators in python	6	CO_CSAMAJ203B_1	R, U, A1
Unit-2	**Python program flow** (a) Indentation (b) Conditional statements (c) Looping & range statement (d) Control statements (e) Function and parameter passing (e) (f) Scope and namespaces	6	CO_CSAMAJ203B_1 CO_CSAMAJ203B_2	R, U, A1
Unit-3	**Data structures** (a) List: introduction, accessing list, operations, working with lists, function and methods (b) Tuples: introduction, accessing tuples, operations, working, functions and methods (c) Dictionaries: introduction, accessing values in dictionaries, working with dictionaries, (d) String manipulation, sets and their operations, working with sequences, list (e) comprehensions	7	CO_CSAMAJ203B_1 CO_CSAMAJ203B_2 CO_CSAMAJ203B_3	R, U, A1
Unit-4	**Functions & Modules** (a) Defining a function (b) Calling a function (c) Types of function & function arguments (d) Global and local variable (e) Importing module (f) Math module & random module (g) Packages	7	CO_CSAMAJ203B_1 CO_CSAMAJ203B_2 CO_CSAMAJ203B_3 CO_CSAMAJ203B_4	R, U, A1, A2
Unit-5	**Object Oriented Programming (OOP)** (a) Class and objects (b) Inheritance and polymorphism (c) Encapsulation and abstraction (d) Advanced OOP concepts (decorators, magic method)	6	CO_CSAMAJ203B_1 CO_CSAMAJ203B_2 CO_CSAMAJ203B_5	R, U, A1, A2
Unit-6	**File handling & exceptions handling** (a) file handling modes (b) opening & closing files (c) reading & writing files (d) writing & appending to files (e) exception & exception handling (f) except clause, try?, finally clause, user defined exception	6	CO_CSAMAJ203B_1 CO_CSAMAJ203B_3 CO_CSAMAJ203B_5 CO_CSAMAJ203B_6	R, U, A1, A2
Unit-7	**Libraries used for machine learning** (a) Scikit-learn (b) NumPy (c) Pandas	7	CO_CSAMAJ203_7	R, U, A1, A2

	(d) Matplotlib and Seaborn (e) Tensorflow (f) Pytorch (g) Keras (h) Opencv (i) Mediapipe			

Text Books:

1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372. [Unit I&II- 2,3,4,5,6,7,8,9 Unit III-11,12].
2. Eric Matthes, "Python Crash Course- A Hands-On, Project-Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.[Unit III-15, Unit IV-16]
3. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2016. [Unit IV- 2,5].

Reference Books:

1. Kamthane, A. N., & Kamthane, A.A. , "Programming and Problem Solving with Python", McGraw Hill Education, 2017.
2. Mark Lutz, "Learning Python", 5th edition, Orelly Publication, 2013, ISBN 978- 1449355739.
3. Ljubomir Perkovic, "Introduction to Computing Using Python- An Application Development Focus", Wiley,2012.

Practical (Laboratory)

CSAMAJ203BL: Programming with Python and ML libraries Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

1. State the key advantages of using Python for machine learning development?
2. Set up a Python development environment for machine learning.
3. Install popular machine learning libraries such as scikit-learn, TensorFlow, and PyTorch?
4. Explain the role of NumPy and Pandas in data pre-processing for machine learning tasks.
5. Load and manipulate datasets using Pandas?
6. Demonstrate data visualization in Python using libraries such as Matplotlib and Seaborn.
7. Illustrate the steps involved in data pre-processing for machine learning tasks.
8. Demonstrate different ways of handling missing values and categorical data during data pre-processing.
9. Explain the concept of feature scaling and its importance in machine learning.
10. Demonstrate different types of feature scaling techniques available in scikit-learn.
11. Demonstrate the process of splitting a dataset into training and testing sets for model evaluation.
12. Demonstrate training of a machine learning model using scikit-learn.
13. State some common algorithms available in scikit-learn for classification and regression tasks.
14. Evaluate the performance of a machine learning model using metrics such as accuracy, precision, recall, and F1-score.
15. Explain the concept of cross-validation and its importance in model evaluation.
16. Describe the process of building and training neural networks using TensorFlow or PyTorch.
17. State some common neural network architectures used in deep learning tasks.
18. Demonstrate handling of overfitting and underfitting in machine learning models.
19. State some resources or methods for further learning and exploring advanced topics in Python programming and machine learning.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:

(Seal) (Seal)

(College Seal)

Course 23CSAMAJ204

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ204	Software Engineering	3		45	3
23CSAMAJ204L	Software Engineering LAB		1	30	2

Course Objectives:

The aim of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_ CSAMAJ204_1	Select and implement different software development process models
CO_ CSAMAJ204_2	Extract and analyse software requirements specifications for different projects
CO_ CSAMAJ204_3	Develop some basic level of software architecture/design
CO_ CSAMAJ204_4	Apply standard coding practices
CO_ CSAMAJ204_5	Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
CO_ CSAMAJ204_6	Identify and implement of the software metrics
CO_ CSAMAJ204_7	Apply different testing and debugging techniques and analysing their effectiveness.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										
6																										
7																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction** a) The Evolving Role of Software b) Software Characteristics c) Changing Nature of Software d) Software Engineering as a Layered Technology e) Software Process Framework f) Framework and Umbrella Activities g) Process Models h) Capability Maturity Model Integration (CMMI)	8		R, U, A1

Unit-2	**Requirement Analysis** (a) Software Requirement Analysis (b) Initiating Requirement Engineering Process (c) Requirement Analysis and Modelling Techniques (d) Flow Oriented Modelling (e) Need for SRS - Characteristics and Components of SRS	10		R, U, A1
Unit-3	**Software Project Management** (a) Estimation in Project Planning Process (b) Project Scheduling	8		R, U, A1
Unit-4	**Risk Management** (a) Software Risks (b) Risk Identification (c) Risk Projection and Risk Refinement (d) RMMM Plan	8		R, U, A1, A2
Unit-5	**Quality Management** (a) Quality Concepts (b) Software Quality Assurance (c) Software Reviews (d) Metrics for Process and Projects.	8		R, U, A1, A2

Suggested Readings

1. R.S. Pressman, "Software Engineering: A Practitioner's Approach", 7/e, McGraw-Hill, 2009.
2. P. Jalote, "An Integrated Approach to Software Engineering", 2/e, Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, "Software Engineering", 2/e, New Age International Publishers, 2008.
4. I. Sommerville, "Software Engineering", 8/e, Addison Wesley, 2006.
5. D. Bell, "Software Engineering for Students", 4/e, Addison-Wesley, 2005.
6. R. Mall, "Fundamentals of Software Engineering", 2/e, Prentice-Hall of India, 2004.

Practical (Laboratory)

CSAMAJ204L: Software Engineering Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Srl #.	**Practical Title**
1	Problem Statement, Process Model
2	Requirement Analysis: • Creating a Data Flow • Data Dictionary, Use Cases
3	Project Management: • Computing FP • Effort • Schedule, Risk Table, Timeline chart
4	Design Engineering: • Architectural Design • Data Design, Component Level Design
5	Testing: • Basis Path Testing

Sample Projects:

1. Criminal Record Management: Implement a criminal record management system for jailers, police officers and CBI officers
2. DTC Route Information: Online information about the bus routes and their frequency and fares

3. Car Pooling: To maintain a web-based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.
4. Patient Appointment and Prescription Management System
5. Organized Retail Shopping Management Software
6. Online Hotel Reservation Service System
7. Examination and Result computation system
8. Automatic Internal Assessment System
9. Parking Allocation System
10. Wholesale Management System

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAMAJ205

Paper Code	Title	Credits		Total Classes (15 weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMAJ205	Database Management Systems	3		45	3
23CSAMAJ205L	Database Management Systems LAB		1	30	2

Course Objectives:

To educate students with fundamental concepts of Database Management Systems, Data Models, Different Database Languages.

Course Outcomes:

Code	Outcome description Upon successful completion of this course, students will be able to
CO_CSAMAJ205_1	Analyse Data Base design methodology.
CO_CSAMAJ205_2	Extract and analyse software requirements specifications for different projects with focus on database requirements and design.
CO_CSAMAJ205_3	Analyse the difference between traditional file system and DBMS.
CO_CSAMAJ205_4	Able to handle with different Data Base languages.
CO_CSAMAJ205_5	Draw various data models for Data Base and write SQL queries.

Course Outcomes mapping with Program Specific Outcomes

Outcomes	PSO01	PSO02	PSO03	PSO04	PSO05	PSO06	PSO07	PSO08	PSO09	PSO10	PSO11	PSO12	PSO13	PSO14	PSO15	PSO16	PSO17	PSO18	PSO19	PSO20	PSO21	PSO22	PSO23	PSO24	PSO25	PSO26
1																										
2																										
3																										
4																										
5																										

Unit	Contents	Hours	Outcomes	Revised Bloom's Taxonomy Levels
Unit-1	**Introduction** a) Characteristics of database b) Data models, c) Database system architecture d) Data independence	6		R, U, A1
Unit-2	**Entity Relationship (ER) Modelling** (a) Entity types (b) Relationships (c) Constraints	8		R, U, A1
Unit-3	**Relational Data Model** (a) Relational model concepts (b) Relational constraints (c) Relational algebra (d) SQL queries	20		R, U, A1
Unit-4	**Database Design** (a) Mapping ER/EER model to relational database	15		R, U, A1, A2

	(b) functional dependencies (c) Lossless decomposition (d) Normal Forms (up to BCNF)			
Unit-5	**Transaction Processing** (a) ACID properties (b) Concurrency control	3		R, U, A1, A2
Unit-6	**File Structure and Indexing** (a) Operations on files (b) File of Unordered and ordered records (c) overview of File organizations (d) Indexing structures for files (Primary index, secondary index, clustering index) (e) Multilevel indexing using B and B+ trees	8		

Suggested Readings

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 6/e, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, "Database Management Systems", 3/e, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, "Database System Concepts", 6/e, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe, "Database Systems Models, Languages, Design and application Programming", 6/e, Pearson Education, 2013.
5. Database Book: "The Principles and Practices Using MySQL", Narain Gehani, University Press.

Practical (Laboratory)

CSAMAJ205L: Database Management Systems Lab [Credit: 1, Lab Hours: 30]

Students are advised to do laboratory/practical practice not limited to, but including the following types of activities:

Create and use the following database schema to answer the given queries
EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	YES	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES		NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

Query List:

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than Rs2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of Rs1500 and Rs2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.

9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don't have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is 'A'.
14. Query to display Name of all employees either have two 'R's or have two 'A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an 'A' in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Delhi location.
26. Query to display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees,, Name who do not have a Manager.
27. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies Rs.100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a 'T'.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Director** (Approved by)
Name: Signature:	Name: Signature:	Name: Signature:
	(Seal)	(Seal)

(College Seal)

Course 23CSAMDC201

Paper Code	Title	Credits		Total Classes (15 Weeks)	Hours / Week
		Theory	Practical / Tutorial		
23CSAMDC201	Advanced MS Excel	2		30	2
23CSAMDC201L	Advanced MS Excel Lab		1	30	2

Course Overview:
This course is designed to provide participants with a comprehensive understanding of Microsoft Excel, a powerful spreadsheet application. Participants will learn essential Excel skills, from basic functionalities to more advanced features, enabling them to effectively organize, analyse, and present data.

Course Objectives

This course enables students to:

1. **Master Advanced Formulas and Functions**
   Understand and apply advanced formulas and functions, including nested functions, array formulas, logical functions and lookup and reference functions, to solve complex problems.
2. **Perform Advanced Statistical Analysis**
   Implement advanced statistical functions and analyse data using built-in statistical tools.
3. **Perform Data Analysis Using PivotTables and PivotChart**
   Create, customize, and utilize PivotTables and PivotChart for sophisticated data analysis and reporting.
4. **Implement Advanced Data Visualization Techniques**
   Design and customize advanced chart types, apply conditional formatting and use sparklines & data bars to effectively visualize data trends.
5. **Import, Export, and Manage Data**
   Import data from various sources, export data in different formats and manage data connections & refresh operations for efficient data handling.
6. **Utilize Conditional Formatting and Data Validation**
   Create dynamic, interactive spreadsheets with customized drop-down lists and data entry controls that enhance data accuracy and visual insights.
7. **Apply Advanced Data Analysis Tools**
   Use tools like Solver for optimization, data tables for sensitivity analysis, Scenario Manager for what-if analysis and Goal Seek for target value analysis.
8. **Protect, Collaborate and Share Excel Files**
   Protect worksheets and workbooks with security measures, share and collaborate on Excel files with others and integrate Excel with other Microsoft Office applications for comprehensive workflows.
9. **Automate Tasks Using Macros and VBA**
   Record and edit Macros, write simple VBA scripts and implement automation to streamline repetitive tasks.
10. **Generate Comprehensive Reports**
    Create, customize and automate complex reports using Excel, ensuring clear and effective presentation of data.

Course Outcomes

Code	Outcome description (Upon successful completion of this course, students will be able to)
CO_23CSAMDC201_1	Utilize advanced formulas and functions to efficiently solve complex data analysis problems.
CO_23CSAMDC201_2	Conduct advanced statistical analysis using built-in statistical functions and tools.
CO_23CSAMDC201_3	Create and customize PivotTables and PivotChart for in-depth data analysis and visualization.
CO_23CSAMDC201_4	Design and implement advanced data visualizations using a variety of chart types, conditional formatting and sparklines.
CO_23CSAMDC201_5	Efficiently import, export, and manage data from multiple sources and formats using Excel.
CO_23CSAMDC201_6	Implement advanced conditional formatting to highlight critical data patterns and trends & apply data validation techniques to ensure data integrity and facilitate efficient data entry.
CO_23CSAMDC201_7	Use advanced data analysis tools such as Solver, data tables, Scenario Manager and Goal Seek to perform complex analyses.
CO_23CSAMDC201_8	Protect workbooks & worksheets to ensure data integrity and security, Collaborate effectively on shared Excel files and integrate Excel workflows with other Microsoft Office applications.
CO_23CSAMDC201_9	Automate repetitive tasks by recording Macros and writing VBA scripts, enhancing productivity.
CO_23CSAMDC201_10	Generate comprehensive and automated reports, presenting data clearly and effectively for decision-making purposes.

Unit	Contents	Hour	Course Outcomes	RBT Levels
1	**Advanced Formulas and Functions** Overview of advanced Excel capabilities, Logical functions (IF, AND, OR, NOT), Lookup and reference functions (VLOOKUP, HLOOKUP, INDEX, MATCH). **Array Formulas and Advanced Functions** Introduction to array formulas, Advanced functions (OFFSET, INDIRECT, ROW, COLUMN). **Advanced Statistical Functions** Overview of advanced statistical functions, Practical applications of statistical analysis.	12	CO1 CO2	R U A1 A2 E C

Unit	Contents	Hour	Course Outcomes	RBT Levels
2	**Data Analysis with PivotTables and PivotChart** Creating and customizing PivotTables**,** Advanced PivotTable techniques (Calculated Fields, Grouping). **Advanced Data Visualization Techniques** Creating and customizing advanced charts (Waterfall, Funnel, Combo), Using sparklines and data bars.	8	CO3 CO4	R U A1 A2 E C
3	**Data Import and Export Techniques** Importing data from various sources (CSV, SQL, Web), Exporting data to different formats. **Conditional Formatting and Data Validation** Advanced conditional formatting rules, Data validation techniques and creating drop-down lists. **Scenario Manager and Goal Seek** Scenario Manager for what-if analysis, Goal Seek for target value analysis. **Advanced Data Analysis Tools** Using Solver for optimization problems, Data tables for sensitivity analysis.	16	CO5 CO6 CO7	U A1 A2 C
4	**Data Protection and Security** Protecting worksheets and workbooks, Password protection and user permissions. **Collaboration and Sharing** Sharing and collaborating on Excel files, Using Excel with other Office applications.	8	CO8	U A1 E
5	**Introduction to Macros** Basics of Macros, Recording and running Macros. **Advanced Macros and VBA** Basic VBA concepts, Writing simple VBA scripts.	8	CO9	U A1 C
6	**Advanced Reporting Techniques** Creating comprehensive reports using Excel, Customizing and automating reports.	8	CO10	U A1, A2 C

References

1. *Alexander, Michael, Richard Kusleika, and John Walkenbach. Microsoft Excel 2019 Bible. Wiley, 2019.*
2. *Harvey, Greg. Excel 2019 All-in-One For Dummies. For Dummies, 2019.*
3. *Alexander, Michael, and Dick Kusleika. Excel 2019 Power Programming with VBA. Wiley, 2019.*
4. *Hong, Bryan. Advanced Excel for Productivity: Learn the Tricks to Maximize Your Data. CreateSpace Independent Publishing Platform, 2019.*
5. *Harvey, Greg. Excel 2019 for Dummies. For Dummies, 2019.*
6. *McFedries, Paul. Excel Data Analysis For Dummies. For Dummies, 2018.*
7. *Bluttman, Ken. Excel Formulas and Functions For Dummies. For Dummies, 2018.*
8. *Humphrey, M.L. Excel 2019 Essentials. M.L. Humphrey, 2019.*

Core/ Major Courses:

Course Code	Title
23CSAMAJ101	Programming in C
23CSAMAJ102	Digital Electronics
23CSAMAJ103	Object Oriented Programming with Java
23CSAMAJ104	Computer Organisation &Architecture
23CSAMAJ201	Data Structures
23CSAMAJ202	Operating Systems
23CSAMAJ203	Graphics programming using OpenGL
23CSAMAJ204	Software Engineering
23CSAMAJ205	Database Management Systems

Skill Enhancement Courses:

Course Code	Title
23CSASEC101	Introduction to Cyber Security
23CSASEC102	Python Programming
23CSASEC201A	Introduction to Web Technology – PHP based
23CSASEC201B	Introduction to Web Technology – JSP based
23CSASEC202	Introduction to R Programming

1. Course Description

Course Code	23PEDVAC101
Course Title	Sports for Life - I
Credits	1
Total Hours	30
Hours per Week	2
Course Type	Value Added Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: a. Covers the Fundamental skills and rules of the Selected Sport. b. Gives an exposure of match practice with the application of rules of the various games.
Prerequisite	Basic knowledge on Sports.
Course Objectives	A student will be able to: 1. Analyse the significance of sports to promote health, fitness, and wellness in life. 2. Relate the values of teamwork, tolerance, goal-setting, and decision making. 3. Design the strategies and tactical moves while playing a sport. 4. Evaluate the importance of physical activity in reference to 3S: strength, speed, and suppleness.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Recall the History of the Game	R
CO2	Explain the rules and their interpretation of the Game	U
CO3	Demonstrate the Fundamental Skills of the Game.	A1
CO4	Examine the duties of the Officials	A2
CO5	Rate the execution of fundamental skills of the Game.	E
CO6	Construct the various playfields with correct markings.	C
CO7	Replicate the basic skills of the game	I
CO8	Re-create the fundamental skills of the game.	M
CO9	Demonstrate the fundamental skills during the game.	P
CO10	Teach the fundamental skills of the game	A
CO11	Design the fundamental skills of the game.	N

Course Content

Units	Content (ANY 1 OUT OF 3 UNITS)	Lecture Hours	COs	RBT

Unit I	**FOOTBALL** **A. <u>Session 1 -</u> History of the Game** **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. . <u>Session 9-14</u> Fundamental Skills:** • **Kicking:** Kicking the ball with inside of the foot, kicking the ball with Full Instep of the foot, kicking the ball with Inner Instep of the foot,kicking the ball with Outer Instep of the foot and Lofted Kick. • **Trapping:** Trapping- the Rolling ball, and the Bouncing ball with sole ofthe foot. • **Dribbling:** Dribbling the ball with Instep of the foot, dribbling the ballwith Inner and Outer Instep of the foot. • **Heading**: In standing, running, and jumping condition. • **Throw-in:** Standing throw-in and Running throw-in. • **Feinting**: With the lower limb andupper part of the body. • **Tackling**: Simple Tackling, Slide Tackling. • **Goal Keeping**: Collection of Ball,Ball clearance- kicking, throwing, and deflecting. **E. <u>Session 15</u>: Game practice** with application of Rules and Regulations.	**30**	**CO1** **CO2** **CO3** **CO4** **CO5** **CO6** **CO7** **CO8** **CO9**	**R** **U** **A1** **A2** **E** **C** **I** **M** **P** **A** **N** **P**
Unit II	**BASKETBALL** **A. <u>Session 1 -</u> History of the Game** **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. Fundamental Skills:**	**30**	**CO1** **CO2** **CO3** **CO4** **CO5**	**R** **U** **A1** **A2** **E** **C** **I**

	• **Passing**: Two hand Chest Pass, two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass. • **Receiving**: Two hand receiving, one hand receiving, receiving in stationary position, receiving while Jumping and Receiving while Running. • **Dribbling**: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. • **Shooting**: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw. • **Rebounding**: Defensive rebound and Offensive rebound. • **Individual Defence**: Guarding the player with the ball and without the ball, Pivoting. **E. <u>Session 15:</u> Game practice with application of Rules and Regulations**		**CO6 CO7 CO8 CO9**	**M P A N P**
Unit III	**ATHLETICS** **A. <u>Session 1 -</u> History of the Game** **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. . Basic skills and techniques of Athletic Events: (Any One)** • **Running Events:** sprint races, middle- and long-distance races, hurdles races • **Jumping Events-** long jump, Triple Jump and High Jump. • **Throwing Events-** Shot put, Discus throw. **E. <u>Session 15:</u> Game practice with application of Rules and Regulations**	**30**	**CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9**	**R U A1 A2 E C I M P A N P**

LEARNING RESOURCES:

1. Sharma, N.P., (2005) Fundamental of Track and Field, Khel Sahitya Kendra, New Delhi, India.
2. Striano, P & DC., (2013) Anatomy of Running: A Guide to Running Right, Hinkler Publishers, UK.
3. Kaur, B., (2020) Officiating and Coaching, Sports Publication, New Delhi.

4. Jain, R., (2012) Play and Learn Track and Field, Khel Sahitya Kendra, New Delhi.
5. Mitra, S., Das, P.K & Bandyopadhayay, N., (2022) Basics of Basketball for Teaching and Coaching Courses, Akansha Publishing House, Darya Ganj, Delhi.
6. Srivastava, A.K., (2010) Book of Rules of Games and Sports, Sports Publication, New Delhi.
7. Jange, H.S. & Pasodi, M.S., (1 January 2018) Officiating and Coaching in Physical Education and Sports, Khel Sahitya Kendra, New Delhi.
8. Hohenstein, M., (1 February, 2000) Games, Bethany House Publishers, a division of Baker Publishing Group, Minnesota, US.

SUGGESTED READING:

1) Mahaboobjan, A., and Viswejan, U. (2021) Rules and Measurements in sports and games, Sports Publication (First Edition), New Delhi.
2) Bain, R., (2019) Rule Book of Games: Football, Alpha Editions.
3) Hawkins, V., (2018) Rule Book of Games: Basketball, Alpha Edition.
4) Singh, A.K., (2022) Basketball- Complete Guide Book – (First Edition), Sport Publication, New Delhi.
5) Amateur Athletic Union of the United States, (2010), Official Athletic Rules and Official Handbook, Nabu Press.
6) Pluff, G.E., (1 January, 2013) The A-Z Basketball Book: What Every Player Needs to Know to be Great at the Game, Zaccheus Entertainment.
7) Singh, L., (2021) Track & Field Rules and Regulations, Khel Sahitya Kendra, New Delhi.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

Formative Assessment & Summative Assessment:

Subject to directions from the Examination Branch (Salesian College, Autonomous) from time to time.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDVAC103
Course Title	Sports for Life – II
Credits	1
Total Hours	30
Hours per Week	2
Course Type	Value Added Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: a. Covers the Fundamental skills and rules of the Selected Sport. b. Gives an exposure of match practice with the application of rules of the various games.
Prerequisite	Basic knowledge on Sports.
Course Objectives	A student will be able to: 1. Analyse the significance of sports to promote health, fitness, and wellness in life. 2. Relate the values of teamwork, tolerance, goal-setting, and decision making. 3. Design the strategies and tactical moves while playing a sport. 4. Evaluate the importance of physical activity in reference to 3S: strength, speed, and suppleness.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Recall the History of the Game	R
CO2	Explain the rules and their interpretation of the Game	U
CO3	Demonstrate the Fundamental Skills of the Game.	A1
CO4	Examine the duties of the Officials	A2
CO5	Rate the execution of fundamental skills of the Game.	E
CO6	Construct the various playfields with correct markings.	C
CO7	Replicate the basic skills of the game	I
CO8	Re-create the fundamental skills of the game.	M
CO9	Demonstrate the fundamental skills during the game.	P
CO10	Teach the fundamental skills of the game	A
CO11	Design the fundamental skills of the game.	N

Course Content

Units	Content	Lecture Hours	Cos	RBT
Unit I	**HANDBALL**	**30**		**R**

	A. <u>Session 1 -</u> History of the Game **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. . <u>Session 9-14</u> Fundamental Skills:** • Catching, Throwing and Ball control • Goal Throws: Jump shot, Centre shot, Dive shot, Reverse shot. • Dribbling: High and low. • Attack and counter attack, simple counter attack, counter attack from two wings and center. • Blocking, Goalkeeping and Defensive skills. **E. Session 15 Game practice with application of Rules and Regulations.**		**CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9 CO10 CO11**	**U A1 A2 E C I M P A N P**
Unit II	**VOLLEYBALL** **A) <u>Session 1 -</u> History of the Game** **B) <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C) <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D) Fundamental skills:** • **Service:** Under arm service, Side arm service, Tennis service, Floating service. • **Pass:** Under arm pass, Overhead pass. • **Spiking and Blocking**. **F. Game practice with application of Rules and Regulations.**	**30**	**CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9 CO10 CO11**	**R U A1 A2 E C I M P A N P**
Unit III	**INDOOR GAMES:** **Badminton** **A) <u>Session 1 -</u> History of the Game** **B) <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C) <u>Session 6-8</u> Rules and their**	**30**	**CO1 CO2 CO3 CO4 CO5 CO6**	**R U A1 A2 E C**

	interpretation and duties of officials. **D) Fundamental Skills** • **Basic Knowledge:** Various parts of the Racket and Grip • **Service:** Short Service, Long Service, Long-high Service. • **Shots:** Over Head Shot, Defensive Clear Shot, Attacking Clear Shot, Drop Shot, Net Shot, Smash. **E) Game Practice with applications of Rules and regulations** **OR** **Table Tennis** **A) <u>Session 1 -</u> History of the Game** **B) <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C) <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D) <u>Session 9-14</u> Fundamental Skills** • **Basic Knowledge:** various parts of the Racket and Grip (Shake Hand & Pen Hold Grip) • Stance: Alternate & Parallel • **Push and Service:** Backhand & Forehand • **Chop:** Backhand & Forehand • **Receive:** Push and Chop with both Backhand & Forehand **E) Game Practice with applications of Rules and regulations.**		**CO7** **CO8** **CO9** **CO10** **CO11** **CO1** **CO2** **CO3** **CO4** **CO5** **CO6** **CO7** **CO8** **CO9** **CO10** **CO11**	**I** **M** **P** **A** **N** **P** **R** **U** **A1** **A2** **E** **C** **I** **M** **P** **A** **N** **P**

LEARNING RESOURCES:

1. Srivastava, A.K., (2010) Book of Rules of Games and Sports, Sports Publication, New Delhi.
2. Daniels, P., & Restak R.MD., (2014) The Body: A Complete User's Guide, National Geographic Publisher, Washington, DC.
3. Jackson, L. Jr., (2014) Racket Wars: Guide Book to all the World's Racket Sports, First Edition, BookBaby Publishers.

SUGGESTED READING:

1. Mahaboobjan, A., and Viswejan, U. (2021) Rules and Measurements in sports and games, Sports Publication (First Edition), New Delhi.
2. Bain, R., (2019) Rule Book of Games: Football, Alpha Editions.
3. Hawkins, V., (2018) Rule Book of Games: Volleyball, Alpha Edition.
4. Singh, A.K., (2022) Volleyball- Complete Guide Book – (First Edition), Sport Publication, New Delhi.

5. Tyson, P & Turman J., (1987) The Handball Book, Human Kinetics Publishers, Canada.
6. McAfee, R.E., (2009) Table Tennis; Steps to Success, Human Kinetics Publishers, Canada.
7. Rai G., (2016) The Art of Table Tennis, Sports Publications, New Delhi.
8. Weatherford, L., (2018) Rule Book of Games: Badminton, Alpha Editions, Ansari Road, New Delhi.
9. Srivastava, A.K., (2009) Badminton Rule Book, Sports Publication, New Delhi.
10. Singh, A.K., (2022) Volleyball: A Complete Guide Book, Sports Publication, New Delhi.
11. Thani, L., (2007) Skills & Tactics; Football Book, Sports Publication, New Delhi.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

Formative Assessment & Summative Assessment:

Subject to directions from the Examination Branch (Salesian College, Autonomous) from time to time.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

SALESIAN COLLEGE
(AUTONOMOUS) | SONADA SILIGURI

Curriculum Document

under

National Education Policy (NEP) 2020 Curriculum Framework

for

Departments of Mathematics

and

Statistics (Minor)

Semesters: I – IV

Regulation Year: 2023

Approved by: _____
(Subhajit Paul, Chairperson, BoS of Mathematics & Statistics.)

Date: _____

CONTENTS

CHAPTER
ONE

PREAMBLE

This culminated document contains the complete curriculum framework with course objectives & outcomes and assessment rubrics for the first two semesters designed by the Dept of Mathematics for its students of four-year undergraduate programmes (FYUGP) with Honours in Mathematics as the single Major and Statistics as one of the Minor subjects. This design aligns with the layout suggested by the UGC published in the document "Curriculum and Credit Framework for Undergraduate Programmes" in 2022[1], and the regulations of Salesian College (Autonomous), Sonada & Siliguri.

1.1 Vision & Mission Statements

Vision: The Department of Mathematics, Salesian College envisages empowering the students with the ability to think critically and rationally along the lines of the robustness of Mathematical logic and to prepare them for the quest for higher knowledge and experiences in the fields of both Academia and Industry with a mindset to collaborate with interdisciplinary fields for a holistic betterment of the society.

Mission: To exercise relevant pedagogies to provide in-depth analysis and the sense of appreciation of Mathematical concepts while fostering scientific temper and encouraging rational thinking.

1.2 Graduate Attributes

1.2.1 Generic outcomes

1. **Complex problem-solving:** The graduates should be able to demonstrate the capability to solve different kinds of problems in familiar and non-familiar contexts and apply the learning to real-life situations.

2. **Critical thinking:** The graduates should be able to demonstrate the capability to
   - apply analytic thought to a body of knowledge, including the analysis and evaluation of policies, and practices, as well as evidence, arguments, claims, beliefs, and the reliability and relevance of evidence,

[1] available at https://www.ugc.gov.in/pdfnews/7193743_FYUGP.pdf.

- identify relevant assumptions or implications; and formulate coherent arguments,
- identify logical flaws and holes in the arguments of others,
- analyse and synthesize data from a variety of sources and draw valid conclusions and support them with evidence and examples.

3. **Creativity:** The graduates should be able to demonstrate the ability to
   - create, perform, or think in different and diverse ways about the same objects or scenarios,
   - deal with problems and situations that do not have simple solutions,
   - innovate and perform tasks in a better manner,
   - view a problem or a situation from multiple perspectives,
   - think 'out of the box' and generate solutions to complex problems in unfamiliar contexts,
   - adopt innovative, imaginative, lateral thinking, interpersonal skills and emotional intelligence.

4. **Communication Skills:** The graduates should be able to demonstrate the skills that enable them to
   - listen carefully, read texts and research papers analytically and present complex information in a clear and concise manner to different groups/audiences,
   - express thoughts and ideas effectively in writing and orally and communicate with others using appropriate media,
   - confidently share views and express herself/himself,
   - construct logical arguments using correct technical language related to a field of learning, work/vocation, or an area of professional practice, and convey ideas, thoughts, and arguments using language that is respectful and sensitive to gender and other minority groups.

5. **Analytical reasoning/thinking:** The graduates should be able to demonstrate the capability to
   - evaluate the reliability and relevance of evidence;
   - identify logical flaws in the arguments of others;
   - analyse and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and address opposing viewpoints.

6. **Research-related skills:** The graduates should be able to demonstrate
   - a keen sense of observation, inquiry, and capability for asking relevant/appropriate questions,
   - the ability to problematize, synthesize, and articulate issues and design research proposals,
   - the ability to define problems, formulate appropriate and relevant research questions, formulate hypotheses, test hypotheses using quantitative and qualitative data, establish hypotheses, make inferences based on the analysis and interpretation of data, and predict cause-and-effect relationships,
   - the capacity to develop appropriate methodology and tools for data collection,

- the appropriate use of statistical and other analytical tools and techniques,
- the ability to plan, execute and report the results of an experiment or investigation,
- the ability to acquire the understanding of basic research ethics and skills in practising/doing ethics in the field/personal research work, regardless of the funding authority or field of study.

7. **Coordination/Collaboration:** The graduates should be able to demonstrate the ability to
   - work effectively and respectfully with diverse teams,
   - facilitate cooperative or coordinated effort on the part of a group,
   - act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

8. **Leadership qualities:** The graduates should be able to demonstrate the capability for
   - mapping out the tasks of a team or an organization and setting direction.
   - formulating an inspiring vision and building a team that can help achieve the vision, motivating and inspiring team members to engage with that vision.
   - using management skills to guide people to the right destination.

9. **Lifelong learning of skills:** The graduates should be able to demonstrate the ability to
   - acquire new knowledge and skills, including 'learning how to learn skills, that are necessary for pursuing learning activities throughout life, through self-paced and self- directed learning aimed at personal development, meeting economic, social, and cultural objectives, and adapting to changing trades and demands of the workplace, including adapting to the changes in work processes in the context of the fourth industrial revolution, through knowledge/ skill development/reskilling,
   - work independently, identify appropriate resources required for further learning,
   - acquire organizational skills and time management to set self-defined goals and targets with timelines.
   - inculcate a healthy attitude to be a lifelong learner.

10. **Digital and technological skills:** The graduates should be able to demonstrate the capability to
    - use ICT in a variety of learning and work situations,
    - access, evaluate, and use a variety of relevant information sources, and use appropriate software for analysis of data.

11. **Multicultural competence and inclusive spirit:** The graduates should be able to demonstrate
    - the acquisition of knowledge of the values and beliefs of multiple cultures and a global perspective to honour diversity,
    - capability to effectively engage in a multicultural group/society and interact respectfully with diverse groups,

- capability to lead a diverse team to accomplish common group tasks and goals.
- gender sensitivity and adopting a gender-neutral approach, as also empathy for the less advantaged and the differently-abled including those with learning disabilities.

12. **Value inculcation:** The graduates should be able to demonstrate the acquisition of knowledge and attitude that are required to
    - embrace and practice constitutional, humanistic, ethical, and moral values in life, including universal human values of truth, righteous conduct, peace, love, non violence, scientific temper, citizenship values,
    - practice responsible global citizenship required for responding to contemporary global challenges, enabling learners to become aware of and understand global issues and to become active promoters of more peaceful, tolerant, inclusive, secure, and sustainable societies,
    - formulate a position/argument about an ethical issue from multiple perspectives,
    - identify ethical issues related to work, and follow ethical practices, including avoiding unethical behaviour such as fabrication, falsification or misrepresentation of data, or committing plagiarism, and adhering to intellectual property rights,
    - recognise environmental and sustainability issues, and participate in actions to promote sustainable development.
    - adopt an objective, unbiased, and truthful actions in all aspects of work,
    - instil integrity and identify ethical issues related to work, and follow ethical practices.
13. **Autonomy, responsibility, and accountability:** The graduates should be able to demonstrate the ability to
    - apply knowledge, understanding, and/or skills with an appropriate degree of independence relevant to the level of the qualification,
    - work independently, identify appropriate resources required for a project, and manage a project through to completion,
    - exercise responsibility and demonstrate accountability in applying knowledge and/or skills in work and/or learning contexts appropriate for the level of the qualification, including ensuring safety and security at workplaces.
14. **Environmental awareness and action:** The graduates should be able to demonstrate the acquisition of and ability to apply the knowledge, skills, attitudes, and values required to take appropriate actions for
    - mitigating the effects of environmental degradation, climate change, and pollution,
    - effective waste management, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living.
15. **Community engagement and service:** The graduates should be able to demonstrate the capability to participate in community-engaged services/activities for promoting the well- being of society.

16. **Empathy:** The graduates should be able to demonstrate the ability to identify with or understand the perspective, experiences, or points of view of another individual or group, and to identify and understand other people's emotions.

1.2.2 Programme specific outcomes

After completion of the 4 year programme with Honours in Mathematics, a student should be able to

(a) demonstrate fundamental systematic knowledge of mathematics and its applications in engineering, science, technology and mathematical sciences;
(b) demonstrate educational skills in areas of analysis, geometry, algebra, mechanics, differential equations, etc;
(c) apply knowledge, understanding, and skills to identify the difficult/ unsolved problems in mathematics and to collect the required information in possible range of sources and try to analyse and evaluate these problems using appropriate methodologies;
(d) fulfil learning requirements in mathematics, drawing from a range of contemporary research works and their applications in diverse areas of mathematical sciences;
(e) apply disciplinary knowledge and skills in mathematics in newer domains and uncharted areas;
(f) identify challenging problems in mathematics and obtain well-defined solutions;
(g) exhibit subject-specific transferable knowledge in mathematics relevant to job trends and employment opportunities.

1.3 Programme Structure

The honours programme in Mathematics at Salesian College (Autonomous) Siliguri spans across eight semesters over four years. Following table shows the total number of courses to be taken by a student in this entire period of study.

Course type	**# Courses**	**Credit/ course**	**Total credits**
Major courses	24	4	96
Minor courses	8	4	32
Multidisciplinary courses	3	3	9
Skill enhancement courses	3	3	9
Ability enhancement courses	4	2	8
Value added courses	10	1	10
Internship	1	4	4
Total	**53**		**168**

Table 1.1: Cumulative course structure for Bachelor Degree programme with Honours with Major in Mathematics

1.3.1 Distribution of courses offered by Dept of Mathematics

Sem	Course code	Course title	Credits
		Major Courses	
I	23MATMAJ101	Classical Algebra & Two-dimensional Geometry	4
	23MATMAJ102	ODE I and Application of Calculus	4
II	23MATMAJ103	Real Analysis I	4
	23MATMAJ104	Abstract Algebra I	4
III	23MATMAJ201	Linear Algebra I	4
	23MATMAJ202	Real Analysis II	4
IV	23MATMAJ203	Abstract Algebra II	4
	23MATMAJ204	Real Analysis III	4
	23MATMAJ205	ODE II and Three-dimensional Geometry	4
V	23MATMAJ301	Numerical Analysis	4
	23MATMAJ302	Multivariate Calculus	4
	23MATMAJ303	Probability Theory	4
	23MATMAJ304	Operations Research	4
VI	23MATMAJ305	Integral Calculus	4
	23MATMAJ306	Complex Analysis	4
	23MATMAJ307	Abstract Algebra III	4
VII	23MATMAJ401	Partial Differential Equations	4
	23MATMAJ402	Metric Spaces	4
	23MATMAJ403	Linear Algebra II	4
	23MATMAJ404	Number Theory *or* Vector Analysis	4
VIII	23MATMAJ405	General Topology	4
	23MATMAJ406	Measure Theory	4
	23MATMAJ407	Differential Geometry *or* Integral Transform	4
	23MATMAJ408	Functional Analysis *or* Graph Theory	4
		Minor Courses	
I	23MATMIN101	Linear Algebra and Differential Equations	4
	23STAMIN101	Statistical Methods	4
III	23MATMIN201	Discrete Mathematics	4

Sem	Course code	Course title	Credits
	23STAMIN201	Fundamentals of Probability	4
V	23MATMIN301	Numerical Analysis *or* Advanced Calculus	4
	23STAMIN301		4
VII	23MATMIN401	Optimisation Techniques *or* Algebra	4
	23STAMIN401		4
Skill Enhancement Courses (SEC)			
I	23MATSEC101	Typesetting in LaTeX	3
II	23MATSEC102	Graph Theory	3
III	23MATSEC201	Mathematical Modelling	3
Value Added Courses (VAC)			
I	23MATVAC101	Introduction to Number Systems	1
II	23MATVAC102	Prerequisites to Linear Algebra	1
III	23MATVAC201	Graphing using GeoGebra	1
IV	23MATVAC202	Poster Presentation	1
V	23MATVAC301	Problem solving techniques	1
VI	23MATVAC302	Students' Seminar	1
Multi-disciplinary Courses (MDC)			
I	23MATMDC101	Basic Mathematics	3
II	23MATMDC102	Mathematics for Competitive Examinations	3

1.3.2 Course matrix for Mathematics Major students (Sem I – IV)

Course code	Type	Course title	Credits (L+T+P)[2]	Classes/ week
Semester I				
23MATMAJ101	Major	Classical Algebra & 2-D Geometry	4 + 0 + 0	4
23MATMAJ102	Major	ODE I & Application of Calculus	4 + 0 + 0	4
23STAMIN101	Minor	Statistical Methods	3 + 0 + 1	5
23MATSEC101	SEC	Typesetting in LaTeX	1 + 0 + 2	5
23MATVAC101	VAC	Introduction to Number Systems	0 + 0 + 1	2

[2] **L:** Lecture, **T:** Tutorial, **P:** Practical / Field work.

Course code	Type	Course title	Credits (L+T+P)	Classes/ week
23ENGAEC101	AEC	Compulsory English I	$2+0+0$	2
23***MDC101	MDC	Multi-disciplinary course	$3+0+0$	3
23SCSVED101	VAC	Value Education	$1+0+0$	1
		Total	22	26
Semester II				
23MATMAJ103	Major	Real Analysis I	$4+0+0$	4
23MATMAJ104	Major	Abstract Algebra I	$4+0+0$	4
23CSCMIN101	Minor	C Programming	$3+0+1$	5
23MATSEC102	SEC	Graph Theory	$3+0+0$	3
23MATVAC102	VAC	Prerequisites to Linear Algebra	$0+0+1$	2
23ENGAEC102	AEC	Compulsory English II	$2+0+0$	2
23***MDC101	MDC	Multi-disciplinary course	$3+0+0$	3
23SCSVED102	VAC	Value Education	$1+0+0$	1
		Total	22	24
Semester III				
23MATMAJ201	Major	Linear Algebra I	$4+0+0$	4
23MATMAJ202	Major	Real Analysis II	$4+0+0$	4
23STAMIN201	Minor	Fundamentals of Probability	$3+0+1$	5
23MATSEC201	SEC	Mathematical Modelling	$3+0+0$	3
23MATVAC201	VAC	Graphing using GeoGebra	$0+0+1$	2
23ENGAEC201	AEC	Environmental Sciences I	$2+0+0$	2
23***MDC201	MDC	Multi-disciplinary course	$3+0+0$	3
23SCSVED201	VAC	Value Education	$1+0+0$	1
		Total	22	24
Semester IV				
23MATMAJ203	Major	Abstract Algebra II	$4+0+0$	4
23MATMAJ204	Major	Real Analysis III	$4+0+0$	4
23MATMAJ205	Major	ODE II and 3-D Geometry	$4+0+0$	4
23CSCMIN201	Minor	Digital Electronics	$4+0+0$	4
23MATVAC201	VAC	Poster presentation	$0+0+1$	2

Course code	Type	Course title	Credits (L+T+P)	Classes/ week
23ENGAEC201	AEC	Environmental Sciences I	$2+0+0$	2
23SCSVED201	VAC	Value Education	$1+0+0$	1
		Total	20	21

CHAPTER

TWO

SYLLABI FOR MAJOR COURSES

2.1 23MATMAJ101: Classical Algebra & Two-dimensional Geometry

2.1.1 Course description

Course code:	**23MATMAJ101**			
Course category:	**Major**			
Title of the course:	**Classical Algebra & Two-dimensional Geometry**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic algebraic operations with real variables;
- binomial theorem with a positive integer index;
- solution of quadratic equations;
- evaluation of determinants up to order 3.

Objectives

At the end of the course, the students should be able to

MAJ101-Ob1 Familiarise themselves with estimation processes using inequalities.

MAJ101-Ob2 Develop an understanding of the argand plane and the complex numbers as vectors.

MAJ101-Ob3 Solve a polynomial equation up to degree 4 and investigate other equations of particular types.

MAJ101-Ob4 Develop an understanding of the conic sections.

Corresponding outcomes

The outcome corresponding to the learning objective **MAJ101-Ob1**, is

MAJ101-CO1: Remember the important inequalities and apply the appropriate inequality for specific problems.

The outcome corresponding to the learning objective **MAJ101-Ob2**, is

MAJ101-CO2: Understand basic structure of Argand plane and perform algebra thereat.

The outcomes corresponding to the learning objective **MAJ101-Ob3**, are

MAJ101-CO3: Solve cubic, biquadratic, reciprocal and binomial equations, demonstrating proficiency in identifying and manipulating these specific equation types.

MAJ101-CO4: Locate positions of roots and exhibit relations of roots and coefficients.

The outcome corresponding to the learning objective **MAJ101-Ob4**, is

MAJ101-CO5: Analyse geometric objects, employ coordinate systems, derive equations, and apply geometric concepts to solve problems.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ101-Ob1** and **MAJ101-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: MAJ101-CO1 Understanding: MAJ101-CO2 Applying: MAJ101-CO1 and MAJ101-CO2	
INEQUALITIES: AM $\geq$ GM $\geq$ HM; Theorem of weighted means. Statements only and applications of m^{th} power theorem, Cauchy-Schwartz inequality, Holder's inequality, Minkowski's inequality. COMPLEX NUMBERS: Polar representation. De Moivre's theorem for rational indices and its applications. Trigonometric, logarithm, exponential and hyperbolic functions of complex variable.		

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ101-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MAJ101-CO3 and MAJ101-CO4 Understanding: MAJ101-CO3 and MAJ101-CO4 Applying: MAJ101-CO3 and MAJ101-CO4	
THEORY OF EQUATIONS: Polynomials and their properties. Relation between roots and coefficients. Transformation of equations. Cubic and biquadratic equations. Cardan's and Ferrari's method. Solutions of reciprocal and binomial equations. Symmetric functions of roots. Location of roots.		

Unit: 3	Credits: 2	Lecture hours: 30
Objectives mapped: **MAJ101-Ob4**	**Cognitive levels achieved through outcomes:** Remembering: MAJ101-CO5 Understanding: MAJ101-CO5 Applying: MAJ101-CO5	
2-DIMENSIONAL GEOMETRY: Transformation of axes. Pair of straight lines. Reduction of general equation of second degree into canonical forms. Tangents and normals. Pole and polars. Polar equations.		

Suggested readings

1. Mapa, S K, *Higher Algebra: Classical*, Sarat Book House.
2. Khan, R M, *Algebra [Classical, Modern, Linear and Boolean]*, New Central Book Agency.
3. Chakravorty, J G, and Ghosh P R, *Advanced Analytical Geometry*, U N Dhur & Sons Pvt Ltd.
4. Khan, R M, *Analytical Geometry of Two and Three Dimensions and Vector Analysis*, New Central Book Agency.

Reference books

1. Andreescu, T, and Andrica, D, *Complex Numbers from A to Z*, Birkhäuser.
2. Burnside, W S, and Panton, A W, *The Theory of Equations*, Wentworth Press.
3. Bej, N K, and Mukherjee, A, *Analytical Geometry Of Two & Three Dimensions (Advanced Level)*, Book & Allied Pvt Ltd.

2.1.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.2 23MATMAJ102: Ordinary Differential Equations I and Applications of Calculus

2.2.1 Course description

	Course code:	**23MATMAJ102**		
	Course category:	**Major**		
	Title of the course:	**Ordinary Differential Equations I and Applications of Calculus**		
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- computational processes in calculus like evaluating limits, investigating continuity, etc.;
- different differentiation techniques, including rules for differentiation, chain rule, product rule, and quotient rule;
- different techniques of integration, such as substitution, integration by parts, partial fractions, etc.

Objectives

At the end of the course, the students should be able to

MAJ102-Ob1 Develop a solid understanding of the basic concepts related to ordinary differential equations (ODEs) including order, linearity, and solutions (particular solutions, general solutions, and initial value problems) and also learn to classify different types of ODEs based on their order, linearity, and degree.

MAJ102-Ob2 Learn various methods and techniques to solve different types of ODEs. These may include first order, second order linear, higher order, special types and system of ODEs.

MAJ102-Ob3 Investigate several properties of a curve and classify them.

MAJ102-Ob4 Calculate length of a curve, area bounded by a curve, and volume of a surface generated by a curve.

Corresponding outcomes

The outcome corresponding to the learning objective **MAJ102-Ob1** is

MAJ102-CO1: Identify different types of ODEs.

The outcomes corresponding to the learning objective **MAJ102-Ob2**, are

MAJ102-CO2: Solve first order ODEs utilising the standard techniques for separable, exact, linear, homogeneous or Bernoulli cases.

MAJ102-CO3: Compute exact solutions of solvable first order ODEs and linear ODEs of higher order using various methods.

MAJ102-CO4: Describe the concepts of general solution and particular integral of a linear ODE of an arbitrary order, and also to obtain them using prescribed methods.

The outcomes corresponding to the learning objective **MAJ102-Ob3**, are

MAJ102-CO5: Remember the formulæ of various attributes and trace a given curve by calculating them.

MAJ102-CO6: Calculate the higher order derivatives and limits of indeterminate forms.

The outcome corresponding to the learning objective **MAJ102-Ob4**, is

MAJ102-CO7: Calculate length of a curve, area bounded by a curve, and volume of a surface generated by a curve.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ102-Ob1** and **MAJ102-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: MAJ102-CO1 Understanding: MAJ102-CO1 and MAJ102-CO4 Applying: MAJ102-CO2 to MAJ102-CO4	
Definition and examples of Ordinary Differential equations (ODEs). Formulation of ODE by eliminating parameters. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.		

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ102-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: MAJ102-CO4 Understanding: MAJ102-CO3	
General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters.		

Unit: 3	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ102-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MAJ102-CO5 Understanding: MAJ102-CO5 Applying: MAJ102-CO5 and MAJ102-CO6	

Application of Differential Calculus: Successive differentiation, Leibnitz theorem. Curvature, convexity and concavity. Asymptotes. Envelope & evolutes. Nature of a singular point. Curve tracing.

Unit: 4	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ102-Ob4**	**Cognitive levels achieved through outcomes:** Remembering: MAJ102-CO7 Understanding: MAJ102-CO7 Applying: MAJ102-CO7	
Application of Integral Calculus: Derivations and illustrations of reduction formulæ of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \sec^n x\,dx$, $\int \tan^n x\,dx$, $\int (\log x)^n\,dx$, $\int \sin nx \cos mx\,dx$ etc. Arc length of a curve, arc length of parametric curves, area enclosed by a curve, area between two curves, area and volume of revolution.		

Suggested readings

1. Ghosh, R K, and Maity K C, *An Introduction to Differential Equations*, New Central Book Agency.
2. Raisinghania, M D, *Ordinary and Partial Differential Equation*, S Chand Publishing.
3. Ross, S L, *Differential Equations*, Wiley.
4. Ghosh, R K, and Maity, K C, *An Introduction to Analysis: Differential Calculus: Part I*, New Central Book Agency.
5. Ghosh, R K, and Maity, K C, *An Introduction to Analysis: Integral Calculus*, New Central Book Agency.

2.2.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.3 23MATMAJ103: Real Analysis I

2.3.1 Course description

Course code:	**23MATMAJ103**
Course category:	**Major**
Title of the course:	**Real Analysis I**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
II	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic algebraic operations with real variables;
- special algebraic operations and functions like indices, logarithms, exponentiations, factorials, etc.;
- sets, relations and mappings;
- statements of common inequalities and manipulating them.

Objectives

At the end of the course, the students should be able to

MAJ103-Ob1 Narrate the definition of real numbers and apply its intrinsic properties.

MAJ103-Ob2 Understand the topology of real numbers.

MAJ103-Ob3 Manipulate and investigate sequences and series of real numbers.

Corresponding outcomes

The outcomes corresponding to the learning objective **MAJ103-Ob1**, are

MAJ103-CO1: Know the axiomatic construction of real numbers and apply Archimedean property to various sums.

MAJ103-CO2: Distinguish between countable and uncountable sets.

The outcome corresponding to the learning objective **MAJ103-Ob2**, is

MAJ103-CO3: Remember and use the results about open and closed sets, limit points, adherent points.

The outcomes corresponding to the learning objective **MAJ103-Ob3**, are

MAJ103-CO4: Know and investigate the definitions and key properties of sequences and series of real numbers and calculate their limits.

MAJ103-CO5: Explain the difference and relation between a Cauchy sequence and a convergent sequence.

Content

Unit: 1	Credits: 1	Lecture hours: 15
Objectives mapped: **MAJ103-Ob1**	**Cognitive levels achieved through outcomes:** Remembering: MAJ103-CO1 and MAJ103-CO2 Understanding: MAJ103-CO1 and MAJ103-CO2 Applying: MAJ103-CO1 and MAJ103-CO2	
REVIEW OF THE SET OF REAL NUMBERS: Algebraic, Order and Completeness axioms. Archimedean property. Density property of rational numbers. Nested interval theorem. Decimal representation of real numbers. Cardinality of sets. Uncountability of $\mathbb{R}$.		

Unit: 2	Credits: 1	Lecture hours: 15
Objectives mapped: **MAJ103-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: MAJ103-CO3 Understanding: MAJ103-CO3 Applying: MAJ103-CO3	
SUBSETS OF $\mathbb{R}$: Interior points, Open sets, Closed sets, Limit points, Derived sets, Bolzano-Weierstrass' theorem, Closure of a Set.		

Unit: 3	Credits: 1	Lecture hours: 15
Objectives mapped: **MAJ103-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MAJ103-CO4 Understanding: MAJ103-CO4 and MAJ103-CO5 Applying: MAJ103-CO4 and MAJ103-CO5	
SEQUENCES OF REAL NUMBERS: Bounded sequence. Convergent and limit of a sequence. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences, Bolzano-Weierstrass' theorem for sequences, limit superior and limit inferior, monotone subsequence theorem (statement only). Cauchy sequence, Cauchy's convergence criterion.		

Unit: 4	Credits: 1	Lecture hours: 15
Objectives mapped: **MAJ103-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MAJ103-CO4 Understanding: MAJ103-CO4 Applying: MAJ103-CO4	
INFINITE SERIES OF REAL NUMBERS: Convergence and divergence, Cauchy criterion. Tests for convergence (statements only): Comparison test (first and second kind), Ratio test, Root test, Condensation test, Raabe's test, Logarithmic test, Gauss's test. Alternating series, Leibniz test, absolute and conditional convergence, Riemann's rearrangement theorem (statement only). (Only) Applications of Abel's test and Dirichlet's test.		

Suggested readings

1. Mapa, S K, *Introduction to Real Analysis*, Sarat Book House.
2. Bartle, R G, and Sherbert, D R, *Introduction to Real Analysis*, Wiley India Edition, Wiley India Pvt Ltd.

Reference books

1. Goldberg, R R, *Methods of Real Analysis*, Oxford & IBH Publishing.
2. Apostol, T M, *Mathematical Analysis*, Narosa Publications.
3. Rudin, W, *Principles of Mathematical Analysis*, Tata McGraw Hill Education.
4. Tao, T, *Analysis I*, TRIM Series, Hindustan Book Agency.
5. Lang, S, *Undergraduate Analysis*, Undergraduate Texts in Mathematics Series, Springer.
6. Abbott, S, *Understanding Analysis*, Undergraduate Texts in Mathematics Series, Springer.

2.3.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.4 23MATMAJ104: Abstract Algebra I

2.4.1 Course description

	Course code: **23MATMAJ104**			
	Course category: **Major**			
	Title of the course: **Abstract Algebra I**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
II	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic properties of addition and multiplication of real numbers, complex numbers, matrices,;
- basic congruence arithmetic;
- composition of functions.

Objectives

At the end of the course, the students should be able to

MAJ104-Ob1 Describe and provide examples (with justifications) of groups from different domains of mathematics.

MAJ104-Ob2 Investigate whether a given subset of a group is a subgroup.

MAJ104-Ob3 Illustrate power of an element, order of an element and order of a group.

MAJ104-Ob4 Demonstrate a coset of a subgroup and prove Lagrange's theorem for a finite group.

Corresponding outcomes

The outcomes corresponding to the learning objectives **MAJ104-Ob1**, are

MAJ104-CO1: Remember the postulates of a group and verify them for a given non-empty set with a binary composition.

MAJ104-CO2: Apply various results to construct a group from an algebraic structure satisfying an incomplete set of postulates.

The outcome corresponding to the learning objective **MAJ104-Ob2**, is

MAJ104-CO3: Prove the necessary and sufficient condition for a subset to be a subgroup, and apply it in various examples.

The outcome corresponding to the learning objective **MAJ104-Ob3**, is

MAJ104-CO4: Prove various results regarding order of an element and order of a group.

The outcome corresponding to the learning objective **MAJ104-Ob4**, is

MAJ104-CO5: State and prove Lagrange's theorem and apply it in various scenarios.

Content

Unit: 1	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MAJ104-Ob1**	**Cognitive levels achieved through outcomes:** Remembering: MAJ104-CO1 Understanding: MAJ104-CO1 and MAJ104-CO2 Applying: MAJ104-CO1 and MAJ104-CO2	

Groupoid, semigroup, monoid, groups, commutative groups; Elementary properties of groups: finite semigroup with cancellation properties is a group, semigroup containing unique solution of $ax = b$ and $xa = b$ is a group. Particularly, $\mathbb{Z}_n$ group, U_n group, Klein's 4 group, symmetric group S_n, alternating group A_n, matrix group $M_n(\mathbb{R})$, multiplicative group of n^{th} roots of unity, Dihedral group, quaternion group (through matrices) etc.

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ104-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: MAJ104-CO3 Understanding: MAJ104-CO3 Applying: MAJ104-CO3	
Subgroups and examples of subgroups; Necessary and sufficient conditions for a subset of a group to be a subgroup; Union and intersection of subgroups; Centralizer, normalizer, center of a group, product of two subgroups.		

Unit: 3	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ104-Ob3** and **MAJ104-Ob4**	**Cognitive levels achieved through outcomes:** Remembering: MAJ104-CO4 and MAJ104-CO5 Understanding: MAJ104-CO4 and MAJ104-CO5 Applying: MAJ104-CO4 and MAJ104-CO5	
Order of an element and a group; Generators, cyclic group and its properties, necessary and sufficient condition; Cosets, properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.		

Suggested readings

1. Mapa, S K, *Higher Algebra: Abstract and Linear*, Sarat Book House.
2. Khan, R M, *Algebra: Classical, Modern, Linear and Boolean*, New Central Book Agency.
3. Herstein, I N, *Topics in Algebra*, Wiley.
4. Dummit, D S and Foote, R M, *Abstract Algebra*, Wiley.

Reference books

1. Chakraborty, A, *Modern Algebra*, Levant Books.
2. Gallian, J A, *Contemporary Abstract Algebra*, Narosa Publishing House.
3. Artin, M, *Abstract Algebra*, Pearson.
4. Rotman, J J, *An Introduction to the Theory of Groups*, Springer Verlag.

2.4.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.5 23MATMAJ201: Linear Algebra I

2.5.1 Course description

Course code:	**23MATMAJ201**
Course category:	**Major**
Title of the course:	**Linear Algebra I**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
III	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with
- basic properties of addition and multiplication of real numbers, complex numbers, matrices, determinants;
- the course 23MATVAC102.

Objectives

At the end of the course, the students should be able to

MAJ201-Ob1 Define and understand vector space and related concepts.

MAJ201-Ob2 Understand Cayley-Hamilton theorem and compute eigenvalues and eigenvectors.

MAJ201-Ob3 Apply elementary operations to find the rank of a matrix.

MAJ201-Ob4 Analyse properties of a linear transformation and establish its properties.

MAJ201-Ob5 Find the change of basis matrix.

Corresponding outcomes

The outcomes corresponding to the learning objective **MAJ201-Ob1**, are

MAJ201-CO1: Define vector space, subspace, basis, linear transformation,

MAJ201-CO2: State and prove various related theorems.

The outcome corresponding to the learning objective **MAJ201-Ob2**, is

MAJ201-CO3: Prove Cayley-Hamilton theorem and compute eigenvalues and eigenvectors.

The outcomes corresponding to the learning objective **MAJ201-Ob3**, are

MAJ201-CO4: Apply elementary operations to find the rank of a matrix.

MAJ201-CO5: Analyse and solve a system of linear equations using rank of the coefficient matrix.

The outcomes corresponding to the learning objective **MAJ201-Ob4**, are

MAJ201-CO6: Prove various related theorems.

MAJ201-CO7: Find the matrix of a linear transformation and determine properties of the same in terms of the matrix.

The outcome corresponding to the learning objective **MAJ201-Ob5**, is

MAJ201-CO8: Find the change of basis matrix.

Content

Unit: 1	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MAJ201-Ob1**	**Cognitive levels achieved through outcomes:** Remembering: MAJ201-CO1 Understanding: MAJ201-CO1 and MAJ201-CO2	
Vector spaces, subspaces, algebra of subspaces, quotient spaces. Linear combination of vectors, linear span, linear independence, basis and dimension. Deletion, Existence, Extension and Replacement theorems for basis of finite dimensional vector spaces. Ordered basis, coordinatisation of vectors.		

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ201-Ob2** and **MAJ201-Ob3**	**Cognitive levels achieved through outcomes:** Understanding: MAJ201-CO2 Applying: MAJ201-CO3 Analysing: MAJ201-CO4	

Rank of a matrix, row and column rank. Determination of rank using elementary operations, echelon matrices, normal form. System of linear equations: homogeneous system, non-homogeneous system. Characteristics polynomial, characteristics equation. Eigenvalues and eigenvectors of a matrix. Cayley-Hamilton Theorem.

Unit: 3	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ201-Ob4** and **MAJ201-Ob5**	**Cognitive levels achieved through outcomes:** Understanding: MAJ201-CO6 and MAJ201-CO8 Evaluating: MAJ201-CO7	
Linear transformations (LT): null space, range space, rank and nullity of a LT, Rank-Nullity theorem. Matrix representation of a LT relative to ordered bases. Algebra of LTs, correspondence between LTs and matrices. Properties of LTs in terms of matrices. Change of coordinate matrix.		

Suggested readings

1. Mapa, S K, *Higher Algebra: Abstract and Linear*, Sarat Book House.
2. Khan, R M, *Algebra: Classical, Modern, Linear and Boolean*, New Central Book Agency.
3. Hoffman, K and Kunze, R, A, *Linear Algebra*, Prentice Hall of India Pvt Ltd.

Reference books

1. Friedberg, S H, Insel, A J, and Spence, L A, *Linear Algebra*, 4th Ed, Prentice Hall of India Pvt Ltd, 2004.
2. Lang, S, *Introduction to Linear Algebra*, 2nd Ed, Springer, 2005.
3. Strang, G, *Linear Algebra and its Applications*, Thomson, 2007.
4. Kumaresan, S, *Linear Algebra – A Geometric Approach*, Prentice Hall of India, 1999.
5. Lay, D C, *Linear Algebra and its Applications*, 3rd Ed, Pearson Education Asia, Indian Reprint, 2007.

2.5.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.5.3 Approval (23MATMAJ201)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Manoj Ray Bakshi	Subhajit Paul	Subhajit Paul

2.6 23MATMAJ202: Real Analysis II

2.6.1 Course description

Course code:	**23MATMAJ202**
Course category:	**Major**
Title of the course:	**Real Analysis II**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
III	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with
- the definition of relations, mappings and related concepts.
- the course 23MATMAJ103.

Objectives

At the end of the course, the students should be able to

MAJ202-Ob1	Define and compute limit of a function.
MAJ202-Ob2	Identify the points of continuity and discontinuity of a function.
MAJ202-Ob3	Understand, prove and apply various properties of continuous functions.
MAJ202-Ob4	Understand the notion of differentiability of a function.
MAJ202-Ob5	Evaluate the Taylor series expansion of a given function.

Corresponding outcomes

The outcomes corresponding to the learning objective **MAJ202-Ob1**, are

MAJ202-CO1: Define both-sided and one-sided limits of a function.

MAJ202-CO2: Prove various theorems and apply them to find the limit of a function.

The outcome corresponding to the learning objective **MAJ202-Ob2**, are

MAJ202-CO3: Define a continuous function.

MAJ202-CO4: Apply various results to determine the continuity of a function.

The outcome corresponding to the learning objective **MAJ202-Ob3**, are

MAJ202-CO5: Understand, prove and apply various properties of continuous functions.

MAJ202-CO6: Uniformly continuous functions and compact sets.

The outcome corresponding to the learning objective **MAJ202-Ob4**, are

MAJ202-CO7: Determine whether a function is differentiable at a given point.

MAJ202-CO8: Prove and apply various related results.

The outcome corresponding to the learning objective **MAJ202-Ob5**, is

MAJ202-CO9: Evaluate the Taylor series expansion of a given function.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 10**
Objectives mapped: **MAJ202-Ob1**	**Cognitive levels achieved through outcomes:** Remembering: MAJ202-CO1 Understanding: MAJ202-CO2 Applying: MAJ202-CO2	
LIMIT OF A FUNCTION: ϵ-δ definition, sequential criterion for limits, divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity.		

Unit: 2	**Credits: 1**	**Lecture hours: 25**
Objectives mapped: **MAJ202-Ob2** and **MAJ202-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MAJ202-CO3 Understanding: MAJ202-CO5 Applying: MAJ202-CO4 Analysing: MAJ202-CO6	
CONTINUITY: ϵ-δ definition, sequential criterion for continuity. Algebra of continuous functions. Continuous functions on an interval: Bolzano's theorem, intermediate value theorem, preservation of intervals theorem. Discontinuities, types of discontinuity. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem. Lipschitz condition. Compact sets: Open cover definition. Characterisations of compact sets, Heine-Borel theorem, sequential and Bolzano-Weierstrass compactness. Continuous functions on compact sets.		

Unit: 3	Credits: 1	Lecture hours: 15
Objectives mapped: **MAJ202-Ob4**	**Cognitive levels achieved through outcomes:** Understanding: MAJ202-CO7 Applying: MAJ202-CO7 Evaluating: MAJ202-CO8	
DIFFERENTIATION: Differentiability of a function at a point and in an interval, Carathéodory's theorem, algebra of differentiable functions. Intermediate value property of derivatives: Darboux's theorem. Relative extrema, absolute extremum theorem. Mean value theorems (MVT): Rolle's theorem, Lagrange's MVT, Cauchy's MVT. Applications of mean value theorem to inequalities and approximation of polynomials.		

Unit: 4	Credits: 1	Lecture hours: 10
Objectives mapped: **MAJ202-Ob5**	**Cognitive levels achieved through outcomes:** Analysing: MAJ202-CO8	
Taylor's theorem with Lagrange's form, Cauchy's form and general form of remainder. Taylor's series and Maclaurin's series expansions of various functions. Application of Taylor's theorem to inequalities.		

Suggested readings

1. Mapa, S K, *Introduction to Real Analysis*, Sarat Book House.
2. Bartle, R G, and Sherbert, D R, *Introduction to Real Analysis*, Wiley India Edition, Wiley India Pvt Ltd.
3. Ghosh, R K, and Maity, K C, *An Introduction to Analysis, Differentail Calculus: Part I*, New Central Book Agency (P) Ltd.
4. Malik, S C, and Arora, S, *Mathematical Analysis*, New Age International Pvt Ltd.

Reference books

1. Goldberg, R R, *Methods of Real Analysis*, Oxford & IBH Publishing.
2. Apostol, T M, *Mathematical Analysis*, Narosa Publications.
3. Rudin, W, *Principles of Mathematical Analysis*, Tata McGraw Hill Education.
4. Tao, T, *Analysis I*, TRIM Series, Hindustan Book Agency.
5. Lang, S, *Undergraduate Analysis*, Undergraduate Texts in Mathematics Series, Springer.
6. Abbott, S, *Understanding Analysis*, Undergraduate Texts in Mathematics Series, Springer.

2.6.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.6.3 Approval (23MATMAJ202)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Subhajit Paul	Subhajit Paul	Subhajit Paul

2.7 23MATMAJ203: Abstract Algebra II

2.7.1 Course description

Course code:	**23MATMAJ203**
Course category:	**Major**
Title of the course:	**Abstract Algebra II**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
IV	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with
- the course 23MATMAJ104.

Objectives

At the end of the course, the students should be able to

MAJ203-Ob1 Understand the relation between normal subgroups and group homomorphisms.

MAJ203-Ob2 Apply the fundamental concepts in ring theory such as of the ideals, quotient rings, integral domains, and fields in further branches of pure and applied Mathematics.

MAJ203-Ob3 Apply ring homomorphism and isomorphism theorems in the branch of modules, Galois Theory and field extensions.

Corresponding outcomes

The outcome corresponding to the learning objective **MAJ203-Ob1**, is

MAJ203-CO1: Identify and manipulate normal subgroups and corresponding group homomorphisms.

The outcome corresponding to the learning objective **MAJ203-Ob2**, is

MAJ203-CO2: Describe and analyse the fundamental concepts in ring theory such as of the ideals, quotient rings, integral domains, and fields.

The outcomes corresponding to the learning objective **MAJ203-Ob3**, are

MAJ203-CO3: Describe ring homomorphism, kernel and image of a homomorphism.

MAJ203-CO4: Demonstrate three ring isomorphism theorems with examples.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ203-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: MAJ203-CO1 Analysing: MAJ203-CO1	
Normal subgroups. Quotient groups. Group homomorphisms. Isomorphism theorems.		

Unit: 2	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MAJ203-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: MAJ203-CO2 Analysing: MAJ203-CO2	
Definition and examples of rings and fields. Properties of rings, subrings, integral domains and fields. Necessary and sufficient conditions for subrings and subfields. Characteristics of a ring. Ideal, ideal generated by a subset of a ring, operations on ideals, prime and maximal ideals. Quotient rings.		

Unit: 3	**Credits: 1**	**Lecture hours: 15**

Objectives mapped: **MAJ203-Ob2**	**Cognitive levels achieved through outcomes:** Understanding: MAJ203-CO3 Applying: MAJ203-CO4 Analysing: MAJ203-CO4
Ring homomorphisms: properties of ring homomorphisms. Isomorphism theorems I, II and III.	

Suggested readings

1. Mapa, S K, *Higher Algebra: Abstract and Linear*, Sarat Book House.
2. Fraleigh, J B, *A First Course in Abstract Algebra*, 7th Ed, Pearson, 2002.
3. Herstein, I N, *Topics in Algebra*, Wiley.
4. Dummit, D S and Foote, R M, *Abstract Algebra*, Wiley.

Reference books

1. Sen, M K, Ghosh, S, Mukhopadhyay P, Maity S, *Topics in Abstract Algebra*, 4th Ed, Universities Press.
2. Chakraborty, A, *Modern Algebra*, Levant Books.
3. Gallian, J A, *Contemporary Abstract Algebra*, Narosa Publishing House.
4. Artin, M, *Abstract Algebra*, Pearson.
5. Rotman, J J, *An Introduction to the Theory of Groups*, Springer Verlag.

2.7.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:

   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.

   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.

   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.7.3 Approval (23MATMAJ203)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Debdut Sengupta	Subhajit Paul	Subhajit Paul

2.8 23MATMAJ204: Real Analysis III

2.8.1 Course description

Course code:	**23MATMAJ204**
Course category:	**Major**
Title of the course:	**Real Analysis III**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
IV	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- the course 23MATMAJ202.

Objectives

At the end of the course,

MAJ204-Ob1 Students will be able to articulate the fundamental principles of Riemann integration and apply them to solve problems.

MAJ204-Ob2 Understanding of sequence and series concepts will enable students to analyse and manipulate functions, providing a strong foundation for advanced mathematical studies.

MAJ204-Ob3 Application of power series in problem-solving scenarios will enhance students' mathematical modeling skills and analytical thinking.

MAJ204-Ob4 Students will develop the ability to reason mathematically and construct logical arguments in the context of calculus concepts.

MAJ204-Ob5 Analyse mathematical structures and understanding the convergence and divergence of functions in various mathematical contexts.

Corresponding outcomes

The outcome corresponding to the learning objective **MAJ204-Ob1**, is

MAJ204-CO1: Articulate the fundamental principles of Riemann integration and apply them to solve problems.

The outcome corresponding to the learning objective **MAJ204-Ob2**, is

MAJ204-CO2: Analyse and manipulate functions, providing a strong foundation for advanced mathematical studies.

The outcome corresponding to the learning objective **MAJ204-Ob3**, is

MAJ204-CO3: Model a given problem in terms of sequences and series of functions and evaluate its various properties.

The outcome corresponding to the learning objective **MAJ204-Ob4**, is

MAJ204-CO4: Solve various problems in the context of Calculus concepts.

The outcome corresponding to the learning objective **MAJ204-Ob5**, is

MAJ204-CO5: Analyse mathematical structures and understanding the convergence and divergence of functions in various mathematical contexts.

Content

Unit: 1	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MAJ204-Ob1** and **MAJ204-Ob2**	**Cognitive levels achieved through outcomes:** Understanding: MAJ204-CO1 Applying: MAJ204-CO2 Analysing: MAJ204-CO2	
RIEMANN INTEGRATION: Formulation of Riemann integration: partition, lower sum, upper sum, inequalities of lower sum and upper sum. Upper integral and lower integral. Darboux's definition of Riemann integration. Necessary and sufficient conditions for Riemann integration. Riemann sum, Riemann's definition of integration. Integrability of functions: continuous functions, functions with finitely many points of discontinuity, functions with infinitely many points of discontinuity. Riemann integrability of functions of the form: cf, $f \pm g$, fg, $\|f\|$, monotone functions. Intermediate value theorem for integrals; Fundamental theorem of Integral Calculus, Mean value theorems of Integral Calculus: First Mean value theorem, Second Mean value theorem, Bonnet's form & Weierstrass form (Statement only).		

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ204-Ob3** and **MAJ204-Ob4**	**Cognitive levels achieved through outcomes:** Understanding: MAJ204-CO3 Applying: MAJ204-CO4 Evaluating: MAJ204-CO3	

SEQUENCE OF FUNCTIONS: Definition, pointwise and uniform convergence, limit function,Cauchy condition for uniform convergence, sup-norm test for uniform convergence, Dini's theorem. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. SERIES OF FUNCTIONS: Definition, pointwise and uniform convergence, sum function, Weierstrass M-test for uniform convergence. Theorems on continuity, derivability and integrability of the sum function of a series of functions, Abel's test and Dirichlet's test (statement only).

Unit: 3	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MAJ204-Ob4** and **MAJ204-Ob5**	**Cognitive levels achieved through outcomes:** Applying: MAJ204-CO5 Evaluating: MAJ204-CO4	
POWER SERIES: Definition, convergence, radius of convergence, interval of convergence, derivability and integration of sum function, term by term differentiation and integration, equality of power series, Abel's theorem and Weierstrass approximation theorem (statement only).		

Suggested readings

1. Ghosh, R K, and Maity, K C, *An Introduction to Analysis, Integral Calculus*, New Central Book Agency (P) Ltd.
2. Ghosh, R K, and Maity, K C, *An Introduction to Analysis, Differentail Calculus: Part II*, New Central Book Agency (P) Ltd.
3. Mapa, S K, *Introduction to Real Analysis*, Sarat Book Distributors.

Reference books

1. Bartle, R G, and Sherbert, D R, *Introduction to Real Analysis*, Wiley India Edition, Wiley India Pvt Ltd.
2. Narayan, S, and Mittal, P K, *Integral Calculus*, S Chand & Co Ltd.
3. Apostol, T M, *Calculus, Vol: I*, Willey student edition, Wiley India Pvt Ltd.
4. Ross, K A, *The Theory of Calculus*, Undergraduate Texts in Mathematics, Springer (SIE), Indian Reprint, 2004.

2.8.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.

(b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.

(c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.8.3 Approval (23MATMAJ204)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Bikiran Das	Subhajit Paul	Subhajit Paul

2.9 23MATMAJ205: Ordinary Differential Equations II & Three-dimensional Geometry

2.9.1 Course description

Course code:	**23MATMAJ205**
Course category:	**Major**
Title of the course:	**Ordinary Differential Equations II & Three-dimensional Geometry**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
IV	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- the course 23MATMAJ101.
- the course 23MATMAJ102.
- basic concepts of 3-D geometry, such as the equation of a plane, distance between points in 3D, and visualization of 3D objects.

Objectives

At the end of the course, the students should be able to

MAJ205-Ob1 Introduce the concept of power series solutions for solving ordinary differential equations, focusing on their convergence and applications.

MAJ205-Ob2 Introduce phase plane analysis as a method for visualizing and understanding the behaviour of solutions to first-order systems of ordinary differential equations.

MAJ205-Ob3 Study stability concepts in the context of phase plane analysis, identifying critical points and classifying them as stable, unstable, or semi-stable.

MAJ205-Ob4 Understand the geometrical terminologies and have a detailed idea of the planes, straight lines in 3D, Spheres, Cylindrical surfaces, Central Conicoids, Paraboloids, Plane sections of Conicoids along with the tangent and normal of the Conicoids.

MAJ205-Ob5 Develop an idea of classification of quadrics.

MAJ205-Ob6 Develop an idea of generating lines.

MAJ205-Ob7 Be familiar with the illustrations of graphing standard quadric surfaces like cones, Paraboloids, hyperboloids and ellipsoids.

Corresponding outcomes

The outcome corresponding to the learning objective **MAJ205-Ob1**, is

MAJ205-CO1: Apply power series method to find the solution of the ordinary differential equation understanding the convergence and divergence.

The outcome corresponding to the learning objective **MAJ205-Ob2**, is

MAJ205-CO2: Learn and apply phase plane analysis techniques to visualize and interpret solutions to first-order systems of differential equations.

The outcome corresponding to the learning objective **MAJ205-Ob3**, is

MAJ205-CO3: Analyse stability concepts in the context of phase plane analysis, identifying critical points and classifying them as stable, unstable, or semi-stable.

The outcomes corresponding to the learning objective **MAJ205-Ob4**, are

MAJ205-CO4: Acquire a level of proficiency in particular in using equation of plane in terms of its intercepts on axis and the equation of the planes through the given point length of the perpendicular from a given point to a given plane.

MAJ205-CO5: Explore the basic concept of the equation of a line, angle between the line and a plane, and the shortest distance between two lines.

MAJ205-CO6: Develop their knowledge and apply the skills in the study of the sphere.

The outcome corresponding to the learning objectives **MAJ205-Ob5** to **MAJ205-Ob7**, is

MAJ205-CO7: Gain a broader understanding on cones, Paraboloids, ellipsoids, hyperboloids and use the facts, formulas and techniques learned in this course to prove applications of those.

Content

Unit: 1	Credits: 2	Lecture hours: 30
Objectives mapped: **MAJ205-Ob1** to **MAJ205-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MAJ205-CO2 Understanding: MAJ205-CO1 Applying: MAJ205-CO1 to MAJ205-CO3	
Ordinary Differential Equations: Singularities and their classifications. Power series solution of a differential equation about an ordinary point, solution about a regular singular point. Equilibrium points, interpretation of the phase plane, critical points and paths of linear systems and non-linear systems.		

Unit: 2	Credits: 2	Lecture hours: 30
Objectives mapped: **MAJ205-Ob4** to **MAJ205-Ob7**	**Cognitive levels achieved through outcomes:** Remembering: MAJ205-CO4 to MAJ205-CO7 Understanding: MAJ205-CO4 to MAJ205-CO7 Applying: MAJ205-CO4 to MAJ205-CO7	
Three Dimensional Geometry: Introduction to coordinate system in three dimension. Straight line, Plane, Spheres, Cylindrical surfaces, Central Conicoids, Paraboloids, Plane sections of Conicoids, Generating lines, Classification of quadrics.		

Suggested readings

1. Chakravorty, J G, and Ghosh, P R, *Advanced Analytical Geometry*, U N Dhur and Sons Pvt Ltd.
2. Khan, R M, *Analytical Geometry of Two and Three Dimensions and Vector Analysis*, New Central Book Agency.
3. Ghosh, R K and Maity, K C, *An Introduction to differential equations*, New Central Book Agency.
4. Raisinghania, M D, *Ordinary and Partial Differential Equations*, S Chand Publishing.
5. Ross, S L, *Differential Equations*, Wiley.

Reference books

1. Coddington, E A, *An Introduction to Ordinary Differential Equations*, Dover Books on Mathematics Series, Dover Publications Inc.
2. Bej, N K, and Mukherjee, A, *Analytical Geometry of Two & Three Dimensions (Advanced Level)*, Book & Allied Pvt Ltd.

2.9.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

2.9.3 Approval (23MATMAJ205)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Snigdha Roy	Subhajit Paul	Subhajit Paul

CHAPTER

THREE

SYLLABI FOR MATHEMATICS MINOR COURSES

3.1 23MATMIN101: Linear Algebra and Differential Equations

3.1.1 Course description

Course code:	**23MATMIN101**			
Course category:	**Major**			
Title of the course:	**Linear Algebra and Differential Equations**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic algebraic manipulations with one or more real variables, matrices, determinants (up to order 3) etc.;
- computational processes in calculus like evaluating limits, investigating continuity, etc.;
- different differentiation techniques, including rules for differentiation, chain rule, product rule, and quotient rule;
- different techniques of integration, such as substitution, integration by parts, partial fractions, etc.

Objectives

At the end of the course, the students should be able to

MIN101-Ob1 Identify an invertible matrix and compute the inverse using elementary operations.

MIN101-Ob2 Investigate a system of linear equations and find the solution(s).

MIN101-Ob3 Compute and analyse the eigenvalues and eigenvectors of a matrix.

MIN101-Ob4 Develop a solid understanding of the basic concepts related to ordinary differential equations (ODEs) including order, linearity, and solutions (particular solutions, general solutions, and initial value problems) and also learn to classify different types of ODEs based on their order, linearity, and degree.

MIN101-Ob5 Learn different techniques to solve first order and higher order ODEs.

Corresponding outcomes

The outcome corresponding to the learning objective **MIN101-Ob1**, is

MIN101-CO1: Use elementary operations to compute rank of a matrix by reducing to echelon or normal forms.

The outcome corresponding to the learning objective **MIN101-Ob2**, is

MIN101-CO2: Identify a solvable system of linear equations and solve it.

The outcomes corresponding to the learning objective **MIN101-Ob3**, are

MIN101-CO3: Compute eigenvalues by solving the characteristic equation and find corresponding eigenvectors,

MIN101-CO4: Use Cayley-Hamilton theorem to find the inverse of a matrix.

The outcome corresponding to the learning objective **MIN101-Ob4**, is

MIN101-CO5: Identify different types of ODEs.

The outcome corresponding to the learning objective **MIN101-Ob5**, are

MIN101-CO6: Apply different techniques to solve first order and higher order ODEs.

Content

Unit: 1	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MIN101-Ob1** to **MIN101-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MIN101-CO1 and MIN101-CO2 Understanding: MIN101-CO1 and MIN101-CO2 Applying: MIN101-CO1 to MIN101-CO4	

Linear Algebra: Elementary operations, Row/column reduced echelon matrix, Rank of matrix, Normal forms, Inverse of a matrix.

Systems of linear equations: $AX = b$. Solutions, Consistency, Coefficient matrix. Homogeneous and non-homogeneous system of equations. Solutions using elementary operations.

Characteristic polynomial and Characteristic equation of a square matrix. Cayley-Hamilton theorem. Computations (only) of eigenvalues and eigenvectors.

Unit: 2	Credits: 2	Lecture hours: 30
Objectives mapped: **MIN101-Ob4** and **MIN101-Ob5**	**Cognitive levels achieved through outcomes:** Remembering: MIN101-CO5 and MIN101-CO6 Understanding: MIN101-CO5 and MIN101-CO6 Applying: MIN101-CO5 and MIN101-CO6	

Differential Equations: Examples and formulations. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.

General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters.

Suggested readings

1. Mapa, S K, *Higher Algebra: Abstract and Linear*, Levant Books.
2. Ghosh, R K, and Maity, K C, *An Introduction to Differential Equations*, New Central Book Agency.
3. Raisinghania, M D, *Ordinary and Partial Differential Equation*, S Chand Publishing.

Reference books

1. Hoffman, K, and Kunze, R, *Linear Algebra*, Prentice Hall India Learning Private Limited.
2. Ross, S L, *Differential Equations*, Wiley.

3.1.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

3.2 23MATMIN201: Discrete Mathematics

3.2.1 Course description

Course code:	**23MATMIN201**
Course category:	**Minor**
Title of the course:	**Discrete Mathematics**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
III	**4**	**4**	**60**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- concepts of sets, functions and relations,
- basic concepts of permutations and combinations.

Objectives

At the end of the course, the students should be able to

MIN201-Ob1 Describe the concepts of mathematical logic.

MIN201-Ob2 Illustrate the concepts of sets, relations, and functions.

MIN201-Ob3 Perform the operations associated with sets, functions, and relations.

MIN201-Ob4 Relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context.

Corresponding outcomes

The outcome corresponding to the learning objective **MIN201-Ob1**, is

MIN201-CO1: Applying mathematical logic to solve problems.

The outcome corresponding to the learning objective **MIN201-Ob2**, is

MIN201-CO2: Understanding sets, relations, functions and discrete structures.

The outcome corresponding to the learning objectives **MIN201-Ob3** and **MIN201-Ob4**, is

MIN201-CO3: Using logical notations to define and reason about fundamental mathematical concepts such as sets relations and functions.

Content

Unit: 1	Credits: 2	Lecture hours: 30
Objectives mapped: **MIN201-Ob2** and **MIN201-Ob3**	**Cognitive levels achieved through outcomes:** Understanding: MIN201-CO2 Applying: MIN201-CO3	
Set theory, operations and algebra, switching circuits as an application. Relations and their properties, equivalence relations, partial order relations. Functions, domain, codomain, range, the properties of one-to-one and onto, composite and inverse functions.		

Unit: 2	Credits: 1	Lecture hours: 15
Objectives mapped: **MIN201-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: MIN201-CO1 Applying: MIN201-CO1	
Introduction to logic, quantifiers and conditional propositions. Truth tables. Tautology and contradiction.		

Unit: 3	Credits: 1	Lecture hours: 15
Objectives mapped: **MIN201-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: MIN201-CO1 Applying: MIN201-CO1	
Fundamental Counting Principles: Permutations, Derangements, Combinations, Permutations and Combinations with repetitions, Binomial theorem. Generalised Inclusion Exclusion Principle. Pigeonhole principle.		

Suggested readings

1. Veerarajan, T, *Discrete Mathematics, with Graph Theory and Combinatorics*, McGraw Hill Education.
2. Rosen, K H, *Discrete Mathematics and its Applications*, 7th Ed, McGraw Hill Education (India) Pvt Ltd.
3. Grimaldi, R P, *Discrete and Combinatorial Mathematics*, Pearson.
4. Malik, D S, and Sen, M K, *Discrete Mathematics*, Revised edition, Cengage Learning.
5. Liu, C L, and Mohapatra, D P, *Elements of Discrete Mathematics*, 4th Ed, McGraw Hill Education (India) Private Limited.

3.2.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

3.2.3 Approval (23MATMIN201)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Debdut Sengupta	Subhajit Paul	Subhajit Paul

CHAPTER

FOUR

SYLLABI FOR SKILL ENHANCEMENT COURSES

4.1 23MATSEC101: Typesetting in LaTeX

4.1.1 Course description

Course code:	**23MATSEC101**			
Course category:	**Skill Enhancement**			
Title of the course:	**Typesetting in LaTeX**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I	**1(L)+2(P) = 3**	**5**	**75**	**2023**

Prerequisites

To attend this course, the students should have access to a computer with internet facility.

Objectives

At the end of the course, the students should be able to

SEC101-Ob1 Use the preamble of the `.tex` file to define document class and layout options.

SEC101-Ob2 Include figures, tables, lists, and mathematical equations in a LaTeX document.

SEC101-Ob3 Draw basic diagrams using Ti*k*Z package.

SEC101-Ob4 Refer to different items within the document.

SEC101-Ob5 Generate a bibliography for a particular document.

Corresponding outcomes

The outcome corresponding to the learning objectives **SEC101-Ob1**, is

SEC101-CO1: Create a LaTeX document with chapters, sections, subsections, etc., and also to manage the paper size and margins.

The outcome corresponding to the learning objective **SEC101-Ob2**, is

SEC101-CO2: Include figures, tables, `longtables`, enumerated and itemized lists, and mathematical equations at desired positions in a LaTeX document.

The outcome corresponding to the learning objective **SEC101-Ob3**, is

SEC101-CO3: Draw line joining two points, circle, ellipse, parabola, ellipse, and other plane geometry diagrams.

The outcome corresponding to the learning objective **SEC101-Ob4**, is

SEC101-CO4: Refer to different items within the document using `hyperref`, `cleveref`, `varioref` packages.

The outcome corresponding to the learning objective **SEC101-Ob5**, is

SEC101-CO5: Use `BibTeX` to maintain bibliographic information and to generate a bibliography for a particular document.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 25**
Objectives mapped: **SEC101-Ob1** and **SEC101-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: SEC101-CO1 and SEC101-CO2 Understanding: SEC101-CO1 and SEC101-CO2 Applying: SEC101-CO1 and SEC101-CO2	
What is LaTeX. Basics for document structuring, preamble preparation, saving a folder. LaTeX commands for font colour, font size, make title, begin document, new page, sectioning. `beamer` document class. Creating Tables, Inserting figures, enumeration list, itemized list, inserting equations.		

Unit: 2	**Credits: 1**	**Lecture hours: 20**
Objectives mapped: **SEC101-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: SEC101-CO3 Understanding: SEC101-CO3	
TikZ PACKAGE: Draw line joining two points, circle, ellipse, parabola, ellipse, and other plane geometry diagrams. Use of nodes.		

Unit: 3	Credits: 1	Lecture hours: 30
Objectives mapped: **SEC101-Ob4** and **SEC101-Ob5**	**Cognitive levels achieved through outcomes:** Remembering: SEC101-CO4 and SEC101-CO5 Understanding: SEC101-CO4 and SEC101-CO5	
REFERENCING: Use of `hyperref`, `cleveref`, and `varioref` packages. Inserting references, Manual reference, Reference using `BibTeX`, citing reference.		

Suggested readings

1. LaTeX for beginners Work book, 5th edition, Document Reference: 3722-2014, March 2014.
2. Kopka, H, and Daly, P W, *Guide to* LaTeX, Addison-Wesley.

Reference books

1. Griffits, D F, and Higham, D J, *Learning* LaTeX, Siam, Philadelphia.
2. Kottwitz, S, LaTeX *Beginner's Guide*, Packt Publishing Ltd.

4.1.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, Practical. Rubrics are as follows:
   (a) Lab report: 10 marks.
   (b) Viva-voce: 10 marks.
   (c) Prepare codes for two problems of 15 marks each, pulled from a pool of 10 questions.. $15 \times 2 = 30$.

4.2 23MATSEC102: Graph Theory

4.2.1 Course description

Course code:	**23MATSEC102**			
Course category:	**Skill Enhancement**			
Title of the course:	**Graph Theory**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
II	**3**	**3**	**45**	**2023**

Objectives

At the end of the course, the students should be able to

SEC102-Ob1 Understand and apply the fundamental concepts in graph theory.

SEC102-Ob2 Apply graph theory based tools in solving practical problems.

Corresponding outcomes

The outcomes corresponding to the learning objective **SEC102-Ob1**, are

SEC102-CO1: Understanding relevance of graphs in different context, ranging from puzzles and games to social science/engineering/computer science.

SEC102-CO2: Solving real life problems based on graph theory.

The outcomes corresponding to the learning objective **SEC102-Ob2**, are

SEC102-CO3: Learning algorithms.

SEC102-CO4: knowing applications of Graph Theory.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **SEC102-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: SEC102-CO1 Applying: SEC102-CO2	
Definition, examples and basic properties of graphs, directed graphs, pseudo graphs, complete graphs, bipartite graphs, isomorphism of graphs. Trees and forests, paths and cycles.		

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **SEC102-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: SEC102-CO1 Applying: SEC102-CO2	
Eulerian circuits, Eulerian graph, semi-Eulerian graph, theorems. Hamiltonian cycles, theorems Representation of a graph by matrix, the adjacency matrix, incidence matrix, weighted graph.		

Unit: 3	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **SEC102-Ob2**	**Cognitive levels achieved through outcomes:** Applying: SEC102-CO3 Analysing: SEC102-CO4	

Shortest path. Tree and their properties, spanning tree, Dijkstra's algorithm, Warshall algorithm, Prim's algorithm. Connectivity, matching in bipartite graphs, matching in general graphs.

Suggested readings

1. Ghosh, D N, *Discrete Mathematics*, Academic Publishers.
2. Rosen, K H, *Discrete Mathematics and its Applications*, 7th Ed, McGraw Hill Education (India) Pvt Ltd.
3. Deo, N, *Graph Theory with applications to Engineering and Computer Science*, PHI Learning.
4. West, D B, *Introduction to Graph theory*, 2nd Ed, Pearson Education India.
5. Sharma, J K, *Discrete Mathematics*, 4th Ed, Laxmi Publications.

4.2.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

4.2.3 Approval (23MATSEC102)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Snigdha Roy	Subhajit Paul	Subhajit Paul

4.3 23MATSEC201: Mathematical Modelling

4.3.1 Course description

Course code:	**23MATSEC201**			
Course category:	**Skill Enhancement**			
Title of the course:	**Mathematical Modelling**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
III	**3**	**3**	**45**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic Calculus,
- the course 23MATMAJ102.

Objectives

At the end of the course, the students should be able to

SEC201-Ob1 Develop mathematical models to represent real-world phenomena across various domains such as Physics, Biology, Economics, Engineering, and Social sciences.

SEC201-Ob2 Enhance problem-solving skills by enabling students to translate real-world problems into mathematical formulations and vice versa, using appropriate modelling techniques.

SEC201-Ob3 Foster critical thinking skills by analysing the limitations, assumptions, and implications of mathematical models, and evaluating their effectiveness in addressing specific problems.

Corresponding outcomes

The outcome corresponding to the learning objective **SEC201-Ob1**, is

SEC201-CO1: Identifying real-world problems, define relevant variables, and formulate appropriate mathematical models to represent those problems.

The outcome corresponding to the learning objective **SEC201-Ob2**, is

SEC201-CO2: Analysing mathematical models using analytical techniques, numerical methods, and simulation to assess their accuracy, stability, and predictive capacity.

The outcome corresponding to the learning objective **SEC201-Ob3**, is

SEC201-CO3: Demonstrating critical thinking skills by questioning assumptions, exploring alternative modelling approaches, and adapting models to new situations or data.

Content

Unit: 1	Credits: 2	Lecture hours: 30
Objectives mapped: **SEC201-Ob1** and **SEC201-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: SEC201-CO1 and SEC201-CO2 Understanding: SEC201-CO2 Applying: SEC201-CO3	
Functions, modelling with linear and exponential functions. Average rate of change, linear functions with applications, Piecewise-linear functions with applications. Fitting linear models to data. Exponential growth functions with applications, Growth factors and rates, doubling time. Compound interest, Exponential decay functions with applications. Fitting exponential models to data, Decay factors and rates, Half-life. Modelling with logarithmic and polynomial functions, Logarithmic functions with applications, Fitting logarithmic models to data, Maxima and minima applications.		

Unit: 2	Credits: 1	Lecture hours: 15
Objectives mapped: **SEC201-Ob3**	**Cognitive levels achieved through outcomes:** Analysing: SEC201-CO3 Evaluating: SEC201-CO3	
Introduction to continuous time models, limitations and advantages of the discrete-time model, the need for continuous time models. Modelling the growth of microorganisms, chemostat. Stability and linearisation methods for system of ODEs.		

Suggested readings

1. Myint, T, and Debnath, L, *Linear Partial Differential Equation for Scientists and Engineers*, Springer, Indian reprint, 2008.
2. Kapoor, J N, *Mathematical Modelling*, New Age International Pvt Ltd Publishers, 2011.
3. Kamalanand, K, and Jawahar, P M, *Mathematical Modelling of Systems and Analysis*, PHI Learning Pvt Ltd, 2018.
4. Giordano, F R, Fox, W P, and Horton, S B, *A First Course in Mathematical Modelling*, Brooks/Cole Cengage Learning, USA, 2013.

4.3.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.

(c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

4.3.3 Approval (23MATSEC201)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Snigdha Roy	Subhajit Paul	Subhajit Paul

CHAPTER

FIVE

SYLLABI FOR MULTI-DISCIPLINARY COURSES

5.1 23MATMDC101: Basic Mathematics

5.1.1 Course description

	Course code:	**23MATMDC101**		
	Course category:	**Multi-disciplinary**		
	Title of the course:	**Basic Mathematics**		
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I / III	**3**	**3**	**45**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- fundamental arithmetic operations like addition, subtraction, multiplication and division.
- derived arithmetic operations like simplifications, squares, square roots, cube and cube roots;
- factorisation of polynomials.

Objectives

At the end of the course, the students should be able to

MDC101-Ob1 Learn the relationship between logarithm and indices and perform basic calculations.

MDC101-Ob2 familiarise themselves with the binomial theorem, including the general formula for expanding the power of a binomial expression.

MDC101-Ob3 Develop the understanding of the fundamental concepts of matrices and determinants, including their definitions, properties, and basic operations among the students.

MDC101-Ob4 Learn various techniques for calculating derivatives, including the addition, product, quotient and chain rules.

MDC101-Ob5 Understand the various techniques for calculating integrals, including basic rules, substitution, integration by parts.

MDC101-Ob6 Calculate area under a curve.

Corresponding outcomes

The outcome corresponding to the learning objective **MDC101-Ob1**, is

MDC101-CO1: Learn and apply the formulæ of logarithm and indices to solve various basic sums.

The outcome corresponding to the learning objective **MDC101-Ob2**, is

MDC101-CO2: Learn and apply binomial theorem to expand a polynomial to a given power.

The outcomes corresponding to the learning objective **MDC101-Ob3**, are

MDC101-CO3: Identify different types of matrices and perform algebra.

MDC101-CO4: Understand the processes to determine adjoint, determinant and inverse (when exists) of a square matrix.

The outcome corresponding to the learning objectives **MDC101-Ob4**, is

MDC101-CO5: Remember and apply various techniques for calculating derivatives, including the addition, product, quotient and chain rules.

The outcome corresponding to the learning objectives **MDC101-Ob5**, is

MDC101-CO6: Remember and apply various techniques for calculating integrals by several techniques such as methods of substitution, by parts, and partial fractions.

The outcome corresponding to the learning objectives **MDC101-Ob6**, is

MDC101-CO7: Apply the Fundamental theorem of Calculus to calculate the area under a curve.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MDC101-Ob1** to **MDC101-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MDC101-CO1 to MDC101-CO3 Understanding: MDC101-CO1 to MDC101-CO4 Applying: MDC101-CO1 to MDC101-CO4	

ALGEBRA: Definitions of indices and logarithms. Illustrations of basic relations and properties of indices and logarithms (integer and rational indices only).

Statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, simple applications.

Concept, notation, order, equality of matrices. Types of matrices: zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations on matrices: Addition and multiplication of matrices; multiplication with a scalar. Non-commutativity of multiplication and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (all matrices will have real entries).

Determinant of a square matrix (up to 3×3 matrices), minors, co-factors, adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

Unit: 2	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MDC101-Ob4** to **MDC101-Ob6**	**Cognitive levels achieved through outcomes:** Remembering: MDC101-CO5 and MDC101-CO6 Understanding: MDC101-CO5 and MDC101-CO6 Applying: MDC101-CO5 to MDC101-CO7	

CALCULUS: Differentiation as the instantaneous rate of change. Derivative of sum, difference, product and quotient of functions. Derivatives of polynomials, logarithmic and exponential functions. Chain rule.

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals and problems based on them. Statement (only) of Fundamental theorem of Calculus and its application to find the area under a curve.

Suggested readings

1. Agarwal, R S, *Senior Secondary Mathematics For Class 11*, Bharti Bhawan.
2. Agarwal, R S, *Senior Secondary Mathematics For Class 12*, Bharti Bhawan.

Reference books

1. Sharma, R D, Mathematics for Class 11 (Vols I & II), Dhanpat Rai Publications (P) Ltd.
2. Sharma, R D, Mathematics for Class 12 (Vols I & II), Dhanpat Rai Publications (P) Ltd.
3. *Arihant All in One Mathematics CBSE Class 12*, Modern Publication.

5.1.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

5.2 23MATMDC102: Mathematics for Competitive Examinations

5.2.1 Course description

	Course code:	**23MATMDC102**		
	Course category:	**Multi-disciplinary**		
	Title of the course:	**Quantitative Aptitude**		
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
II	**3**	**3**	**45**	**2023**

Prerequisites

Before attending the course, students should be familiar with
- different types of number system;
- fundamental arithmetic operations like addition, subtraction, multiplication and division;
- Basic operations like simplifications, squares, square roots, cube and cube roots;
- Terms like time, speed, distance, profit, loss;
- Basic geometric shapes like triangle, quadrilateral, circles.

Objectives

At the end of the course, the students should be able to

MDC102-Ob1 Develop a strong foundation in number systems and fundamental operations enabling students from various disciplines to enhance their mathematical reasoning, problem-solving skills.

MDC102-Ob2 Equip students with the necessary knowledge and techniques to solve a wide range of quantitative problems related to daily life, commonly encountered in competitive exams and real-world scenarios.

MDC102-Ob3 Foster critical thinking and logical reasoning skills by applying mathematical concepts to analyse and interpret numerical data.

Corresponding outcomes

The outcomes corresponding to the learning objective **MDC102-Ob1**, are

MDC102-CO1: Remember and understand the different types of number system and the arithmetic operations on them.

MDC102-CO2: Develop an understanding of the processes to find the squares, square roots, cube, cube roots.

MDC102-CO3: Develop an understanding of permutation and combination and analyse them to solve simple problems.

The outcomes corresponding to the learning objective **MDC102-Ob2**, are

MDC102-CO4: Understand and analyse the concepts of Heights and Distances, Profit and Loss, Discount, Partnership Business, Mixture, Time and distance, Time & Work, Percentage problems, Boats and Streams, Ratio & Proportion, Pipes and Cistern, Problems on Trains, Simple and Compound Interest and use them in solving simple problems thereby enhance performance in competitive exams that include quantitative aptitude.

MDC102-CO5: Remember the different formulae to find the area and volume of simple geometric shapes and apply them in simple problems.

The outcome corresponding to the learning objective **MDC102-Ob3**, is

MDC102-CO6: Understand data interpretation and analyse complex data presented in various forms, such as tables, bar graphs, pie charts, and line graphs.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **MDC102-Ob1**	**Cognitive levels achieved through outcomes:** Remembering: MDC102-CO1 Understanding: MDC102-CO2 and MDC102-CO3 Applying: MDC102-CO2 and MDC102-CO3	
Numbers, HCF & LCM of numbers. Decimal fractions. Simplifications. Square & cube roots. Permutations and Combinations. Decimals problems, fractions problems. Numbers and Ages. Surds and Indices. Averages, Odd man out & Series. Calendar. Clocks.		

Unit: 2	**Credits: 2**	**Lecture hours: 30**
Objectives mapped: **MDC102-Ob2** and **MDC102-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: MDC102-CO5 Understanding: MDC102-CO4 and MDC102-CO6 Applying: MDC102-CO4 to MDC102-CO6	

Heights and distances. Profit and loss. Discounts. Partnership business. Mixture. Time and distance. Time & work. Percentage problems. Boats and streams. Ratio & proportion. Pipes and cistern. Problems on trains. Simple and compound interest. Volume & surface areas.

Data interpretation, tabulation, bar graphs, pie charts, line graphs.

Suggested readings

1. Agarwal, R S, *Quantitative Aptitude*, S Chand.
2. Oswal Publishers, *Quantitative Aptitude For Competitive Examinations : IBPS, SSC, SBI, RBI, AFCAT, CDS, UPSC, UPPSC, CAT, MAT, XAT, Railways*, Oswal Printers & Publishers Pvt Ltd.

Reference books

1. Khattar, D, *The Pearson Guide to Quantitative Aptitude for Competitive Examinations*, Pearson.
2. FACE, *Aptipedia: Aptitude Encyclopedia*, Wiley.

5.2.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.
2. *Summative Assessment*: 50 marks, 2 hours. Marks distribution as follows:
   (a) Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
   (b) Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
   (c) Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

CHAPTER
SIX

SYLLABI FOR VALUE ADDED COURSES

6.1 23MATVAC101: Introduction to Number Systems

6.1.1 Course description

Course code:	**23MATVAC101**			
Course category:	**Value added**			
Title of the course:	**Introduction to Number Systems**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I	**1**	**2**	**30**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic arithmetic and algebraic calculations.

Objectives

At the end of the course, the students should be able to

VAC101-Ob1 Present a problem oriented introductory knowledge of Number systems and its applications to binary arithmetic.

VAC101-Ob2 Focus on the study of Boolean algebra and its applications to logic gates.

VAC101-Ob3 Understand the concept of Sum of Products (S.O.P) and product of sums (P.O.S) and its applications to Karnaugh map.

Corresponding outcomes

The outcome corresponding to the learning objective **VAC101-Ob1**, is

VAC101-CO1: Acquire basic knowledge of number systems and its applications to binary arithmetic.

The outcome corresponding to the learning objective **VAC101-Ob2**, is

VAC101-CO2: Employ Boolean algebra and its applications to logic gates.

The outcome corresponding to the learning objective **VAC101-Ob3**, is

VAC101-CO3: Understand the concept of Sum of Products (SOP) and product of sums (POS) and its applications to Karnaugh map.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 30**
Objectives mapped: **VAC101-Ob1** to **VAC101-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: VAC101-CO1 and VAC101-CO2 Understanding: VAC101-CO1 to VAC101-CO3 Applying: VAC101-CO1 to VAC101-CO3	
Introduction to conventional number systems: Base, place value, digits available for a particular base. Binary, octal, decimal, hexadecimal number systems and conversions. Gray Code, Excess-3 code, code conversion. ASCII, EBCDIC codes and their conversions. Binary arithmetic and applications. Signed and unsigned binary numbers. 1's complement and 2's complement representation. Simple problems. Boolean algebra and Logic gates: Basic logic circuits, logic gates, truth tables. Laws and properties of Boolean algebra. De Morgan's theorem and its applications. Min term, Max term with their applications. Conjunctive Normal Form (POS), Disjunctive Normal Form (SOP) and their inter-conversions. K-map and its applications. Simplifications of K-maps by Boolean theorems.		

Suggested readings

1. Mano, M Morris, *Digital Logic and Computer Design*, Pearson Education.
2. Salivahanan, S and Arivazhagan, S, *Digital Circuits And Design*, Oxford University Press.

6.1.2 Assessment

1. *Summative Assessment*: 50 marks. Assignment based.

6.2 23MATVAC102: Prerequisites to Linear Algebra

6.2.1 Course description

Course code:	**23MATVAC102**
Course category:	**Value Added**
Title of the course:	**Prerequisites to Linear Algebra**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
II	**1**	**2**	**30**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic arithmetic and algebraic calculations.

Objectives

At the end of the course, the students should be able to

VAC102-Ob1 Learn and manipulate different types of matrices in its general form.

VAC102-Ob2 Define determinants and manipulate them using various formulæ.

Corresponding outcomes

The outcomes corresponding to the learning objective **VAC102-Ob1**, are

VAC102-CO1: Multiply two compatible matrices.

VAC102-CO2: Compute transpose of a matrix.

VAC102-CO3: Identify symmetric, skew symmetric, nilpotent, idempotent matrices.

VAC102-CO4: Find inverse of a matrix using elementary transformations.

The outcomes corresponding to the learning objective **VAC102-Ob2**, are

VAC102-CO5: Define determinants using permutation definition.

VAC102-CO6: Compute determinants using various formulæ.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 30**
Objectives mapped: **VAC102-Ob1** and **VAC102-Ob2**	**Cognitive levels achieved through outcomes:** Applying: VAC102-CO1 to VAC102-CO5	
MATRICES: Algebraic operations on matrices. Block multiplication of matrices. Transpose of a matrix. Symmetric and Skew-symmetric matrices. Types of matrices: orthogonal, idempotent, nilpotent matrix. Adjoint of a matrix, Inverse of a matrix, complex matrices. DETERMINANTS: Definition of determinant using permutations. Minors and Cofactors, complementary minor, multiplications of determinants, determinants of symmetric and skew-symmetric matrices, Cramer's Rule.		

Suggested readings

1. Mapa, S K, *Higher Algebra: Abstract and Linear*, Sarat Book House.

6.2.2 Assessment

1. *Summative Assessment*: 50 marks, Assignment based.

6.2.3 Approval (23MATVAC102)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Manoj Ray Bakshi	Subhajit Paul	Subhajit Paul

6.3 23MATVAC201: Graphing using GeoGebra

6.3.1 Course description

Course code:	**23MATVAC201**
Course category:	**Value Added**
Title of the course:	**Graphing using GeoGebra**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
III	**1**	**2**	**30**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- fundamental mathematical concepts, including algebra, geometry, and trigonometry;
- basic calculus concepts, including limits, derivatives, and integrals.
- basic computer literacy, including proficiency in using computer software and navigating interfaces.

Objectives

At the end of the course, the students should be able to

VAC201-Ob1 Learn and manipulate GeoGebra interface to create graphs of various functions.

VAC201-Ob2 Showcase the educational applications of GeoGebra in teaching and learning.

Corresponding outcomes

The outcomes corresponding to the learning objective **VAC201-Ob1** and **VAC201-Ob2**, are

VAC201-CO1: Students will proficiently navigate GeoGebra, utilising its basic tools for mathematical exploration.

VAC201-CO2: Dynamic geometry construction skills will allow students to visualise and manipulate geometric objects dynamically.

VAC201-CO3: The ability to connect algebraic and graphical representations will enable students to explore and analyse mathematical relationships effectively.

VAC201-CO4: Applying GeoGebra to investigate functions and calculus concepts dynamically, gaining insights into mathematical ideas.

VAC201-CO5: The creation of interactive demonstrations and simulations will allow students to communicate mathematical concepts effectively.

VAC201-CO6: The creation of custom tools and scripts in GeoGebra, tailoring the software to address specific mathematical problems.

VAC201-CO7: The course will demonstrate the diverse educational applications of GeoGebra in teaching and learning mathematics.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 30**
Objectives mapped: **VAC201-Ob1** and **VAC201-Ob2**	**Cognitive levels achieved through outcomes:** Applying: VAC201-CO1 to VAC201-CO7	
Introduction to GeoGebra: Overview of GeoGebra interface: Introduction to GeoGebra software; navigation and basic tools. Dynamic geometry construction: Creating points, lines, and circles, exploring dynamic constructions with sliders. Algebraic and graphical representations: Inputting algebraic expressions and equations, connecting algebraic and graphical representations. Exploring functions in GeoGebra: Graphical analysis of functions, dynamic exploration of function transformations. Advanced Features and Customisations: Advanced dynamic geometry: Using advanced geometric tools, exploring 3D geometry in GeoGebra. Calculus concepts in GeoGebra: Investigating limits graphically, dynamic exploration of derivatives and integrals. Interactive demonstrations: Designing interactive demonstrations, showcasing GeoGebra applications in mathematics.		

Suggested readings

1. GeoGebra Tutorials by official GeoGebra website: Beginner Tutorials – GeoGebra at https://www.geogebra.org/m/ys2eur3x.
2. YouTube Khan Academy – GeoGebra at https://www.geogebra.org/m/rZHGCANX.
3. GeoGebra Tube at https://www.geogebra.org/?lang=en.

4. Coursera: GeoGebra Course at https://www.geogebra.org/m/kMm1U3DQ.

6.3.2 Assessment

1. *Summative Assessment*: 50 marks, Assignment based.

6.3.3 Approval (23MATVAC201)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Bikiran Das	Subhajit Paul	Subhajit Paul

6.4 23MATVAC202: Poster Presentation

6.4.1 Course description

Course code:	**23MATVAC202**
Course category:	**Value Added**
Title of the course:	**Poster Presentation**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
IV	**1**	**2**	**30**	**2023**

Prerequisites

Before attending the course, students should be familiar with
- basics of computer literacy.
- the course 23MATSEC101.

Objectives

At the end of the course, the students should be able to

VAC202-Ob1 Create and present a poster on a given topic.

Corresponding outcomes

The outcomes corresponding to the learning objective **VAC202-Ob1**, are

VAC202-CO1: Create a poster using a presentation software.

VAC202-CO2: Present the poster with vocal clarity and confidence.

VAC202-CO3: Answer questions from the audience.

Content

Unit: 1	Credits: 1	Lecture hours: 30
Objectives mapped: **VAC202-Ob1**	**Cognitive levels achieved through outcomes:** Applying: VAC202-CO1 to VAC202-CO3	
PRESENTATION SOFTWARE MS POWERPOINT OR EQUIVALENT: Creating a poster using available templates. PRESENTATION SOFTWARE LaTeX: Creating a poster using `tikzposter` or `beamerposter` document classes. Language and vocabulary for presenting the poster: outline, summary, background, problem, materials, methods, and processes. Explaining and discussing data in the form of figures and tables. Understanding and answering questions from the audience.		

Suggested readings

1. `tikzposter` and `beamerposter` tutorials at https://www.overleaf.com/learn/latex/Posters.
2. PowerPoint tutorials at https://youtube.com/playlist?list=PLpQQipWcxwt_KvhjMTsADzon_GY_vBGRL&si=vJFk0C2XPq0XCTAU.
3. Anthony, L, *Presenting Research in Science and Engineering*, 2nd Ed, DTP Publishing, Tokyo, Japan, 2010.

6.4.2 Assessment

1. *Summative Assessment*: 50 marks, Assignment based.

6.4.3 Approval (23MATVAC202)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Snigdha Roy	Subhajit Paul	Subhajit Paul

CHAPTER

SEVEN

SYLLABI FOR STATISTICS MINOR COURSES

7.1 23STAMIN101: Statistical Methods

7.1.1 Course description

Course code:	**23STAMIN101**			
Course category:	**Minor**			
Title of the course:	**Statistical Methods**			
Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
I / II	**3(L)+1(P) = 4**	**5**	**75**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic arithmetic and algebraic calculations.
- coordinate geometry, concept of straight lines.

Objectives

At the end of the course, the students should be able to

STAMIN101-Ob1 Demonstrate the history of statistics and present the data in various forms.

STAMIN101-Ob2 Understand and analyse the concepts of central tendency and dispersion.

STAMIN101-Ob3 Apply the concept of correlation and regression for relating two or more related variables.

STAMIN101-Ob4 Analyse data to measure association of attributes.

Corresponding outcomes

The outcome corresponding to the learning objective **STAMIN101-Ob1**, is

STAMIN101-CO1: Demonstrate the history of statistics and present the data in various forms.

The outcome corresponding to the learning objective **STAMIN101-Ob2**, is

STAMIN101-CO2: Understand and analyse the concepts of central tendency and dispersion.

The outcome corresponding to the learning objective **STAMIN101-Ob3**, is

STAMIN101-CO3: Apply the concept of correlation and regression for relating two or more related variables.

The outcome corresponding to the learning objective **STAMIN101-Ob4**, is

STAMIN101-CO4: Analyse data to measure association of attributes.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **STAMIN101-Ob1**	**Cognitive levels achieved through outcomes:** Remembering: STAMIN101-CO1 Understanding: STAMIN101-CO1 Applying: STAMIN101-CO1	
Type of Data: Primary and secondary data, quantitative and qualitative data, nominal and ordinal data, cross section and time series data, discrete and continuous data. Presentation of Data: Presentation by tables and by diagrams, construction of tables with one, two and three factors of classification, diagrammatic representations, frequency distributions for discrete and continuous data, representing distributions graphical by histogram and frequency polygon, stem & leaf and box-plot; cumulative frequency distributions (inclusive and representation of a frequency conclusive method and Ogive. Stem-leaf and Box-plot diagrams. Horizontal and vertical bar charts.		

Unit: 2	**Credits: 1**	**Lecture hours: 15**
Objectives mapped: **STAMIN101-Ob2**	**Cognitive levels achieved through outcomes:** Remembering: STAMIN101-CO2 Understanding: STAMIN101-CO2 Applying: STAMIN101-CO2	
Descriptive Statistics: Measure of central tendency; measures of dispersion, moments and quartiles, measure of skewness and kurtosis for both grouped and ungrouped data.		

Unit: 3	Credits: 1	Lecture hours: 20
Objectives mapped: **STAMIN101-Ob3**	**Cognitive levels achieved through outcomes:** Remembering: STAMIN101-CO3 Understanding: STAMIN101-CO3 Applying: STAMIN101-CO3	
Bivariate Analysis: Scatter diagram, regression, curve between two variables and concept of error in regression, principles of least squares; fitting of first, second and third degree. Concept of correlation coefficient and its properties.		

Unit: 4	Credits: 1	Lecture hours: 25
Objectives mapped: **STAMIN101-Ob4**	**Cognitive levels achieved through outcomes:** Remembering: STAMIN101-CO4 Understanding: STAMIN101-CO4 Applying: STAMIN101-CO4	
Analysis of Categorical Data: Fundamental set of frequencies, consistency of data; Measures of association and contingency-table; Association of attributes and various measurement of association; Analysis of data on two characters and three characters.		

List of practicals

Following problems are to be done using calculators, or spreadsheet programme software.

1. Charts and diagrams.
2. Grouping of data.
3. Preparation of Histogram, frequency polygon and ogive from a set of given data.
4. Measure of central tendency, dispersion, moments, skewness and kurtosis of frequency distribution.
5. Calculation of correlation co-efficient from bivariate data. Interpretation of data and diagram.
6. Calculation of Spearman's rank correlation co-efficient from qualitative data.
7. Fitting of regression line by least square method.

Suggested readings

1. Gun, A M, Gupta, M K and Dasgupta, B, *Fundamentals of Statistics (Volume One)*, World Press Private Ltd.
2. Gupta, S C and Kapoor, V K, *Fundamentals of Mathematical Statistics*, S Chand & Sons.

3. Bhattacharya, D and Roychowdhury, S, *Statistics – Theory and Practice*, U N Dhar Publications.

4. Mukherjee, A, *Fundamental Treatise On Probability And Statistics*, Shreetara Prakashani.

5. Kendall, M G and Stuart, A, *Advanced Theory of Statistics*, John Wiley & Sons Inc.

6. Gupta, S C, *Fundamentals of Statistics*, Himalaya Publishing House.

7.1.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*:

   (a) *Theory examination*: 50 marks, 2 hours; weighed down to 50% (25 marks). Marks distribution as follows:
      i. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
      ii. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
      iii. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

   (b) *Practical examination*: 50 marks; weighed down to 50% (25 marks). Marks distribution as follows:
      i. Lab report: 10 marks.
      ii. Viva-voce: 10 marks.
      iii. Solve three questions for 10 marks each, chosen randomly from a pool of ten questions. $10 \times 3 = 30$.

7.2 23STAMIN201: Fundamentals of Probability

7.2.1 Course description

Course code:	**23STAMIN201**
Course category:	**Minor**
Title of the course:	**Fundamentals of Probability**

Semester	*Credits*	*Lecture hours in a week*	*Total lecture hours*	*Regulation year*
III / IV	**3(L)+1(P) = 4**	**5**	**75**	**2023**

Prerequisites

Before attending the course, students should be familiar with

- basic arithmetic and algebraic calculations.
- coordinate geometry, concept of straight lines.
- basic calculus.
- the course 23STAMIN101.

Objectives

At the end of the course, the students should be able to

STAMIN201-Ob1 Understand the preliminary ideas of probability.

STAMIN201-Ob2 Have the concept of random variables.

STAMIN201-Ob3 Manipulate different standard probability distributions of both discrete and continuous types.

STAMIN201-Ob4 Manipulate two dimensional random variables.

STAMIN201-Ob5 Have an idea about the mathematical expectation of random variables along with bivariate random variables.

Corresponding outcomes

The outcomes corresponding to the learning objective **STAMIN201-Ob1**, are

STAMIN201-CO1: Learn and understand the differences among different definitions of probability and apply various results therein.

STAMIN201-CO2: Demonstrate the use of Bayes' theorem in decision making.

The outcome corresponding to the learning objectives **STAMIN201-Ob2** and **STAMIN201-Ob3**, is

STAMIN201-CO3: Distinguish between a discrete and a continuous random variable.

The outcome corresponding to the learning objective **STAMIN201-Ob4**, is

STAMIN201-CO4: Demonstrate the concept of joint, marginal and conditional probability distributions and the bivariate transformations.

The outcome corresponding to the learning objective **STAMIN201-Ob5**, is

STAMIN201-CO5: State and prove various properties of expectation, variance and covariance.

Content

Unit: 1	**Credits: 1**	**Lecture hours: 10**
Objectives mapped: **STAMIN201-Ob1**	**Cognitive levels achieved through outcomes:** Understanding: STAMIN201-CO1 Applying: STAMIN201-CO2	

Concept of deterministic and non-deterministic experiments. Sample space, events. Definitions of Probability: classical, statistical, and axiomatic. Conditional Probability, independent events. Laws of addition and multiplication. Theorem of total probability, Bayes' theorem and its applications.

Unit: 2	**Credits: 1**	**Lecture hours: 25**
Objectives mapped: **STAMIN201-Ob2**, **STAMIN201-Ob3** and **STAMIN201-Ob5**	**Cognitive levels achieved through outcomes:** Understanding: STAMIN201-CO3 Applying: STAMIN201-CO5	
Random variables. Probability distributions: probability density and probability mass functions, cumulative distribution functions. Mathematical expectation in one and two dimensional distribution with its related results. Moments generating and characteristic functions, Cauchy-Schwartz inequality. Standard discrete probability distributions: Uniform, Geometric, Binomial, Poisson, and Hyper-geometric. Standard continuous probability distributions: Uniform, Gamma, Beta, Exponential and Normal. Transformation of random variables.		

Unit: 3	**Credits: 1**	**Lecture hours: 10**
Objectives mapped: **STAMIN201-Ob4**	**Cognitive levels achieved through outcomes:** Understanding: STAMIN201-CO4 Applying: STAMIN201-CO4	
Two dimensional Random variables and bi-variate distributions. Marginal and conditional distributions, independence of variables. Bivariate transformations with illustrations.		

List of practicals (Credit: 1)

Following problems are to be done using calculators.

1. Application problems based on binomial distribution.
2. Application problems based on Poisson distribution.
3. Problems based on area property of normal distribution.
4. Fitting of binomial distributions for given n.
5. Fitting of Poisson distributions.
6. Fitting of normal distribution when parameters are not given.
7. Approximation of hypergeometric distribution by binomial distribution.
8. Approximation of binomial distribution by Poisson distribution.
9. Approximation of Poisson distribution by Normal distribution.

Suggested readings

1. Gun, A M, Gupta, M K and Dasgupta, B, *Fundamentals of Statistics (Volume One)*, World Press Private Ltd.

2. Gupta, S C and Kapoor, V K, *Fundamentals of Mathematical Statistics*, S Chand & Sons.

3. Das, N G, *Statistical Methods*, Combined edition: volume 1 & 2, McGraw Hill Education.

4. Bhattacharya, D and Roychowdhury, S, *Statistics – Theory and Practice*, U N Dhar Publications.

5. Mukherjee, A, *Fundamental Treatise On Probability And Statistics*, Shreetara Prakashani.

6. Kendall, M G and Stuart, A, *Advanced Theory of Statistics*, John Wiley & Sons Inc.

7. Gupta, S C, *Fundamentals of Statistics*, Himalaya Publishing House.

7.2.2 Assessment

1. *Formative Assessment*: 50 marks, as per Assessment & Evaluation Framework Document of Salesian College.

2. *Summative Assessment*:

   (a) *Theory examination*: 50 marks, 2 hours; weighed down to 50% (25 marks). Marks distribution as follows:

      i. Five questions of 2 marks each, out of eight questions. Remembering and Understanding levels of Revised Bloom's Taxonomy (RBT). $2 \times 5 = 10$.
      ii. Four questions of 5 marks each, out of six questions. Analysis, and Applying levels of RBT. $5 \times 4 = 20$.
      iii. Two questions of 10 marks each, out of four questions. Analysis, Application and Evaluation levels of RBT. $10 \times 2 = 20$.

   (b) *Practical examination*: 50 marks; weighed down to 50% (25 marks). Marks distribution as follows:

      i. Lab report: 10 marks.
      ii. Viva-voce: 10 marks.
      iii. Solve three questions for 10 marks each, chosen randomly from a pool of ten questions. $10 \times 3 = 30$.

7.2.3 Approval (23STAMIN201)

(Prepared by) **Course Faculty**	(Checked and verified by) **Head of the Dept**	(Approved by) **Dean**
Manoj Ray Bakshi	Subhajit Paul	Subhajit Paul

APPROVAL BY BOS MEMBERS

The above syllabi are discussed thoroughly and found to be fit for the students in Semesters I – IV (Regulation year: 2023) in Mathematics Major, Mathematics Minor and Statistics Minor (as applicable) studying in Salesian College (Autonomous) Siliguri.

Subhajit Paul Vice Chairperson, BoS, Mathematics & Statistics	
Bikiran Das Secretary, BoS, Mathematics & Statistics	
Debdut Sengupta Member, BoS, Mathematics & Statistics	
Snigdha Roy Member, BoS, Mathematics & Statistics	
Manoj Ray Baksi Member, BoS, Mathematics & Statistics	
Dr Atasi Deb Roy Asso Prof, Dept of Mathematics, University of Calcutta; External Expert, BoS, Mathematics & Statistics	

Prof Kajal Kumar Mondal Dept of Mathematics, Coochbehar P B University; External Expert, BoS, Mathematics & Statistics	
Prof Arindam Sengupta Dept of Statistics, University of Calcutta; External Expert, BoS, Mathematics & Statistics	
Dr Bibaswan Dey Asst Prof, Dept of Mathematics, University of North Bengal (NBU); Nominated by Vice Chancellor (NBU), BoS, Mathematics & Statistics	
Anuj Kumar Bhagat Senior Research Fellow, Dept of Mathematics, IIT Delhi; Alumni Representative, BoS, Mathematics & Statistics	
Divyata Chhetri Deputy Manager, Retail Assets – Home Loans, HDFC Bank, Industry Representative, BoS, Mathematics & Statistics	

Salesian College Sonada

(Autonomous)
AssistantBeautyTherapist

Semester-I
Hours-30
Sessions-15
Credits-1

Objectives:BeautyTherapyisafielddedicatedtoenhancingaperson'sphysicalappearanceandwell-beingtoo. Thiscoursepertainingtoinvolveawiderangeof treatmentsand techniques designedtoimproveskin,hair,nails and overall relaxation.

DetailedModule

Session1-IntroductiontoBeautySectorandServices.

Session2-Maintenance ofworkarea.

Session3-PreparingClientorTreatment.**Session4**-
Sterilization and disinfection process**Session 5**-
Disposal of waste.

Session6-BasicSkincareServices.

Session7-Anatomy,FunctionandTypesofSkin.**Session8**-
ActionofFacial, NeckandShoulder Massage.

Session9-PositionofFace,NeckandShoulder.

Session10-FaceCleansingMethod.

Session11-Knowingcorrectbeautyproduct.

Session12-SafetyPrecautions(variousskinconditions).

Session13-Contraactionandclientaftercare.

Session14-TimeIntervalsforFacialoranySkinApplication.

Session15-Evaluation(Viva-Voce)

ModeofEvaluation:ProjectSubmission&Viva-Voce.

Salesian College Sonada

(Autonomous)
AssistantBeautyTherapist

Semester- II
Hour-30
Session-15
Credit-1

Objectives: Thiscourseintendstofamiliarizestudentswithdifferenttypesofequipments, materials, products and techniques.

Detailed Module

Session1-IntroductiontoBasicWaxingandThreadingservices.

Session2-MethodofWaxing Treatment.

Session3-MethodofApplicationandRemovalofWaxing Products.

Session4-DirectionofHair Growth.

Session5-Precautionary measuresduringthewaxingprocess.

Session6-ThreadingServices.

Session7-Determinationoftoolsandmaterialsduring threading.

Session 8- Importance of using a Thread Design for Threading.**Session9**-Importanceofservicesandrecord keeping.

Session10-Pedicureservices.

Session11-Manicureservices.

Session12-Anatomy,FunctionandCharacteristicsofNail Growth.

Session13-SimpleMakeupServices.

Session14-Identifyingbasicskintypesandtones.

Session15-Evaluation(Viva-Voce)

ModeofEvaluation:Projectsubmission&Viva-Voce.

Assessment

FormativeAssessment:50marks(50%Weightage)asperAssessment&Evaluation Framework Document of Salesian College

Salesian College Sonada

(Autonomous)

AssistantBeautyTherapist

Semester- III
Hour-30
Session-15
Credit-1

Objectives

Thiscourseintendstofamiliarizestudentswithdifferenttypesofsituationandbuild communication with the clients.

Detailed Module

Session1-MaintenanceofHealthandsafetyintheworkplace

Session2-HealthandSafetyMeasures**intheWorkplace**

Session3-Useofworkequipments,controlofsubstancehazardoustohealth

Session4-Createpositiveimpressioninworkplace

Session5-.Clientscareand communication

Session 6- Providing clear recommendation to the client, maintain clients confidentiality**Session 7**- Planning and organizing service feedback files documents

Session8-Maintenanceofaccuraterecordsofclientstreatmentandproductstocklevels **Session 9**- Simple hair dressing Services

Session10-HairStructureandhairshaftstructure

Session11-Varioushairaccessories

Session12-Handlingcustomersprivacyandmodesty

Session13-SimpleMehendiServices

Session14-Factorsimpactingcustomerscomfortandsatisfaction

Session15-Evaluation(Viva-Voce)

Salesian College Sonada

(Autonomous)
AssistantBeautyTherapist

Semester- IV
Hour-30
Session-15
Credit-1

Objectives:

This course empowers students to develop effective communication skills tailored for the workplace, while also familiarizing them with a range of tasks and services essential to professional success.

Detailed Module

Session1.Hairanatomy.
Session2. StructureofHair;Hairgrowthcycle,differenttypesofhair andhairconditions.
Session3. Haircareservices.
Session4. Haircuttingmethodsandsectioninghair.
Session5. Toolsandequipment's,maintenanceandsanitationofcuttingforhygieneandclient safety.
Session6. EyelashesextensionandNailextensionmethod(stepsandequipment's)
Session7. Facebleachmethods.
Session8. Timeinterval forfacebleach, hairandskin application.
Session9. Hair prebleach Method.
Session10. Hairhighlight:stepsandequipment's.
Session11. Processoftemporaryandpermanent Hairstraightening.
Session12. Processoftemporaryandpermanent Haircurl.
Session13. Stylingafterhaircutting:Blowdryingandstylinghairtoenhancethefinishedlook.
Session14. Utilizeworkequipmenteffectivelytomanageandcontrolhazardoussubstances.
Session15. Evaluation(Viva-Voce)

Assessment

FormativeAssessment:50marks(50%Weightage)asperAssessment&Evaluation Framework Document of Salesian College

SummativeAssessment:50marks(50%Weightage)asperAssessment&Evaluation Framework Document of Salesian College

Course Faculty **(Prepared By)**	**Dean** **(Approved By)**
Name – **Signature -**	**Name –** Terence Mucha **Signature -** DEAN Arts, Humanities & Social Sciences Salesian College Sonada (Autonomous) Darjeeling, WB – 734 209

CO-ORDINATOR
Internal Quality Assurance Cell
Salesian College Sonada (Autonomous)
Darjeeling, WB – 734 209

Salesian College

(Autonomous)
Sonada - Siliguri

National Education Policy (NEP) 2020 Curriculum Framework

For

Physical Education (Non-Major Papers)

Department of Physical Education

Curriculum Document
2023 – 2024

Vision

To prepare Physical Education leaders of high academic calibre with a holistic development of body, mind and spirit nurtured with a strong commitment to serve humanity.

Mission

To give all students opportunities and experiences that lead to the achievement of total wellness and result in a longer and healthier life.

To develop a quality physical education program that emphasizes enjoyable participation in physicalactivities; to help students develop the knowledge, attitude, motor skills, social skills and confidence neededto begin and maintain a healthy physically active lifestyle for the rest of their life.

1. Programme Overview

Bachelor of Arts is a four-year degree programme with the possibility of completing the fourth year with research if a particular student secures 75% CGPA in the previous exams.

2. Programme Objectives and Outcomes (POs)

1. The curriculum would enable the pass out to select the inherited talented children for various sports activities.
2. The pass out shall be able to orient children in schools with the fundamental skills of selected sports as per their inherited potential.
3. The pass out shall be able to devise training program for athletes engaged in different sports activities
4. The curriculum shall enable them to officiate, supervise various sports tournaments and orient them in organizing sports events at all levels.
5. The curriculum would enable the pass out students to be entrepreneur (to start their own fitness centre, gym, spa etc) and device appropriate fitness program for different genders and age groups of people.
6. The curriculum would enable the pass out to devise training program for physically challenged peoples

After completion of the programme, a student will be able to:	
Knowledge	PO01: Grasp the theories of Physical Education philosophy, sociology, and psychology.
	PO02: Acquaint him/herself with the history of the Indian Physical Education system, its educational policies, commissions and committees.
	PO03: Relate his/her understanding of guidance and counselling, peace and value education in various classroom situations and societal experiences.
	PO04: Gain awareness about the various contemporary issues in Physical Education.
Skills	PO05: Demonstrate his/her communication skills through paper presentation on subject as well as various interdisciplinary themes.
	PO06: Construct instructional designs, scholastic & co-scholastic curriculum designs.
	PO07: Integrate and apply ICT in learning process
	PO08: Acquaint him/herself with the diverse current Physical education problems and other related issues like SSA, Inclusive education, unemployment, population explosion, poverty, and national disintegration.
Competence	PO09: Explore new ideas and thoughts through the application of theoretical knowledge of education subject and statistical techniques and pedagogical analysis.
	PO10: Initiate self-sufficiency, sincerity, independent thinking as education is a lifelong process for empowering the student to face all challenges in his/her future endeavours.
	PO11: Develop concern for the society, nation as well as promote the feeling of internationalism by comparing our Physical Education system with that of other developed countries.

3. Programme Specific Objectives & Outcomes (PSOs)

Knowledge	PSO1: A student develops a clear idea about the subject Physical Education and Sports, like nature, scope and aim of Physical Education, factors, different agencies of Physical Education and Sports.
	PSO2: A student gathers knowledge about Physical Education and Sports Psychology, its theories, and their implication in the field of education and education system.
	PSO3: A student develops knowledge about the detailed history of the Indian Physical Education system.
	PSO4: A student internalises the basics of Anatomy, Physiology and Exercise Physiology, relation between Anatomy and Physiology and importance of scientific analysis in the field of Physical Education.
	PSO5: A student develops knowledge about basic of Indian Sports as well as Western Sports.
	PSO6: A student develops the concept of coaching and training, various types of training and basic skills necessary for coaching.
	PSO7: A student develops the concept of research and statistics to develop skill in analysing descriptive measures, concept of Learning Curve and its uses in Physical Education, measures of relationship and organize relevant data and to represent data through graphs and to develop skill in analysing and displaying data.
	PSO8: S/he also develops knowledge about the importance of different types of sports in the field of Physical Education.
Skills	PSO1: Astudent will develop a clear idea about the subject Physical Education, like nature, scope and aim of Physical Education, factors, different agencies of Physical Education and Sports.
	PSO2: A student will execute the educational implications of the theories of Sports Psychology.
	PSO3: A student will construct Physical Education and Sports Instructional Designs, Scholastic and Co-Scholastic Curriculum designs.
	PSO4: A student will develop an understanding of Sports Technology, ICT and e-learning.
	PSO5: A student will advocate the importance of Coaching and Training.
	PSO6: A student will develop the skill of using computer in Physical Education and Sports, ICT & e-learning.
	PSO7: A learner will exhibit an excellent communication skill, Skill for Democratic Citizenship and related theories, teaching skills, life skill education, peace, and value education.
Competence	PSO1: A learner demonstrates competencies required to use computers in Physical Education and Sports, communication, ICT & e-learning for implementing instructional techniques and different models of teaching.
	PSO2: A student will analyse the detailed history of Indian Physical Education system.
	PSO3: A student will develop a positive attitude towards developing one's own potentials (both biological & cultural) and talents.
	PSO4: A student will be capable of self-paced and self-directed learning aimed at personal development.
	PSO5: A student will envision a society where people from all walks of life enjoy equal and equitable rights and opportunities.
	PSO6: A student will compute statistical analysis in the field of Physical Education research.
	PSO7: A student will analyse the contemporary trends in Physical Education.

4. Programme Matrix

Course Code	Course Type	Title of the Course	Credit	Lecture Tutorial Practical (L+T+P)	Total Hours	Total Marks
Semester 1						
23PEDMIN101	Minor	Introduction of Physical Education and Sports	4	3+0+1	75	100
23PEDMDC101	MDC	Fitness, Recreation and Sports Management	3	3+0+0	45	100
23PEDVAC5	VAC	Sports for Life	1	0+0+1	30	100
23PEDVAC101	VAC	Organization and Management in Sports	1	0+1+0	30	100
Total			9	6+1+2	180	400
Semester 2						
23PEDMIN102	Minor	Management of Physical Education and Sports	4	3+0+1	75	100
23PEDMDC102	MDC	Health and Fitness Education	3	3+0+0	45	100
23PEDVAC7	VAC	Sports for Life	1	0+0+1	30	100
23PEDVAC102	VAC	Contemporary Issues in Sports	1	0+1+0	30	100
Total			9	6+1+2	180	400

1. Course Description

Course Code	23PEDMIN101
Course Title	Introduction of Physical Education and Sports
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Minor
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: 1. Covers the basic concepts of Physical Education. 2. Gives an exposure on the Sociological and Philosophical Foundations of Physical Education. 3. Makes the students understand the history and importance of Physical Education.
Prerequisite	Basic knowledge on Physical Education and Sports.
Course Objectives	A student will be able to: 1. State the meaning, definition and scope of Physical Education and Sports. 2. Illustrate the modern concept, misconceptions, need and importance of Physical Education. 3. Discuss the Sociological and Philosophical Foundations of Physical Education. 4. Analyse the role of games and sports in National and International integration. 5. Summarise the History of Physical Education and Sports in India. 6. Support the contribution of Akhadas, Vyayamshalas and National Institutes of Physical Education in India. 7. Discuss the Olympic Movement and the historical background of the Asian Games.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	State the meaning, definition and scope of Physical Education and Sports.	R
CO2	Discuss the historical development of Physical Education and Sports in India	U
CO3	Apply the sociological and philosophical principles of Physical Education and Sports	A1
CO4	Research on the contribution of Eminent Physical Educationists.	A2
CO5	Discriminate between Ancient and Modern Olympics.	E

CO6	Plan Yoga and Prayanama activity session.	C		
CO7	Replicate proper techniques of Yoga and Prayanama.	I		
CO8	Perform correct techniques of Yoga and Prayanama	M		
CO9	Demonstrate correct techniques of Yoga and Prayanama	P		
C010	Teach correct techniques of Yoga and Prayanama	A		
CO11	Design correct techniques of Yoga and Prayanama	N		
Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**INTRODUCTION** a. Meaning, Definition & Scope of Physical Education and Sports. b. Aim, Objectives, Need & Importance of Physical Education and Sports. c. Misconceptions and Modern concept of Physical Education. d. Career Opportunities of Physical Education & Sports.	**15**	**CO1**	**R U A1 A2 E C**
Unit II	**HISTORICAL DEVELOPMENT** a. Historical Development of Physical Education and Sports in India - Pre and Post Independence periods - Contribution of Akhadas, Vyayamshalas and National Institutes of Physical Education in India b. Historical background and concept of Ancient & Modern Olympic Games, Asian Games and Commonwealth Games. c. Contribution of Eminent Physical Educationists. d. National Sports Awards- Arjuna Award, Dronacharya Award & Dhyanchand Award.	**15**	**CO2 CO4 CO5**	**R U A1 A2 E C**
Unit III	**FOUNDATIONS OF PHYSICAL EDUCATION & SPORTS** a. Sociological Foundation- Meaning and definition of Sociology, Society and Socialization. b. Biological Foundation: Growth & Development c. Philosophical Foundations- naturalism, pragmatism, realism, idealism	**15**	**CO3**	**R U A1 A2 E C**

	d. Role of games and sports in National and International integration, Ethics of Sports.			
Unit IV	**FIELD PRACTICAL** a. Yoga Asana: Standing position, Sitting Position, Supine Position, Prone Position, Inverted Position (Compulsory one asana in each position) b. Prayanama: Kapalbhati, Bhramari, Anulom Vilom (Any 2)	**30**	**CO6 CO7 CO8 CO9 CO10 CO11**	**I M P A N**

LEARNING RESOURCES:

1. Kamlesh, M. L. & Singh, M. K. (2006) Foundation of Physical Education (Naveen Publications).
2. Singh, A. et al. (2000) Essentials of Physical Education, Kalyani Publishers, Ludhiana, Punjab.
3. Jain, D., (2005) Principles of Physical Education, Khel Sahitya Kendra, New Delhi, India.
4. Deshmukh, S.V., (2012) Philosophical, Sociological, Historical and Recreational Basis of Physical Education and Sports, Sports Publication, New Delhi.
5. Srinivasan, M.V., (2013) Handbook of Physical Education, Swastik Publication, Nai Sarak, Delhi.
6. Prasad, Y.V.R.K., (2017) Methods of Teaching Physical Education, Discovery Publishing House, Ansari Road, Darya Ganj, New Delhi.
7. Bhunia, B., (2016) Modern Physical Education Sports and Globalization, SB Enterprises, Bangalore, India.

SUGGESTED READING:

1. Graham, G. (2001) Teaching Children Physical Education: Becoming a Master Teacher. Human Kinetics, Champaign, Illinois, USA.
2. Lau, S.K. (1999), Great Indian players, New Delhi, Sports Publication
3. Lumpkin, A. (2007) Introduction to Physical Education, Exercise Science and Sports Studies, McGraw Hill, New York, U.S.A.
4. Siedentop, D. (2004) Introduction to Physical Education, Fitness and Sport, McGraw Hill Companies Inc., New York, USA.
5. Shaffer, D.R. (2002) Developmental Psychology: Childhood and Adolescence. Thomson, Sydney, Australia
6. Shukla, (2000) Mother on Education, National Council of Teacher Education, New Delhi.
7. Wuest, D.A. & C.A. Bucher (2006) Foundations of Physical Education, Exercise Science, and Sports. McGraw Hill Companies, Inc., New York, USA.
8. Sharma, N.P., (2009), Sports History, KSK Publisher & Distributors, New Delhi – 110002.
9. Bhattacharyya, A.K. (2012), Dimensions of Physical Education: Principles, Foundations Interpretations, Classique Books, Kolkata-12

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

i. ***Formative Assessment*:** 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*:** 50 marks (25 Marks Theory + 25 Marks Practical)

Theory (50 Marks Exam to be converted to 25 Marks):

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT – (30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Practical (50 Marks Exam to be converted to 25 Marks):

SL. No.		
1	Lab. Note Book	10
2	Viva-voce	10
3	Practical	30
TOTAL		**50**

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDMDC101
Course Title	Fitness, Recreation and Sports Management
Credits	3
Total Hours	45
Hours per Week	3
Course Type	Multi-Disciplinary Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: 1. Covers the basic concepts of Fitness, Recreation & Sports Management. 2. Gives an exposure on the components of Physical Fitness. 3. Discusses the types of recreational activities for different age group.
Prerequisite	Basic knowledge on Sports, Fitness and Recreation.
Course Objectives	A student will be able to: 1. Summarize the concepts of fitness, Recreation and Sports Management. 2. Express the components of Physical Fitness and factors affecting them. 3. Discuss the assessment and maintenance methods of Fitness components. 4. Design recreational activities for different age groups 5. Support the therapeutic aspects of recreational activities. 6. Explain the principles, functions, and purpose of Sports Management. 7. Analyse the scope of Management in Physical Education and Sports.

Course Outcomes based on RBT and Cognitive Level Mapping

At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Define the concept, types, and components of fitness.	R
CO2	Discuss the various assessment and maintenance techniques of components of fitness.	U
CO3	Construct various types of recreational activities for different age groups	A1
CO4	Analyse the therapeutic aspects of recreational activities.	A2
CO5	Rate the factors affecting fitness	E
CO6	Develop management skills in Physical Education and Sports.	C

Course Content				
Units	**Content**	**Lecture Hours**	**COs**	**RBT**
Unit I	**INTRODUCTION TO FITNESS** a. Meaning, Definition, Importance of fitness. b. Components of Skill and health related physical fitness, factors affecting fitness. c. Measurement of fitness through different tools and techniques.	**15**	**CO1 CO2 CO5**	**R U A1 A2 E C**
Unit II	**RECREATION AND RECREATIONAL ACTIVITIES** a. Meaning, Definition, and Importance of Recreation. b. Types of recreational activities for different age groups. c. Therapeutic aspects of recreational activities.	**15**	**CO3 CO4**	**R U A1 A2 E C**
Unit III	**INTRODUCTION TO SPORTS MANAGEMENT** a. Meaning, Definition, Scope, and principles of Sports Management. b. Management of Events, Equipment and Play Fields in Physical Education and Sports. c. Budget- meaning, source of income, expenditure, and preparation of budget.	**15**	**CO6**	**R U A1 A2 E C**

LEARNING RESOURCES:

1. Nathial, M.S., (2009) Sports, Health and Physical Education, Khel Sahitya Kendra, New Delhi.
2. Restak, R.M.D., (2014) The Bosy: A Complete User's Guide, National Geographic Publishers, Washington, D.C., US.
3. Singh, Y., (2005) Sports Management, Sports Publication, New Delhi.
4. Chelladurai, P & Kerwin, S., (2017) Human Resource Management in Sport and Recreation, Human Kinetics, US.
5. Arora, S, Agarwal, M & Gupta, B., (2019) A Textbook on Physical Education and Health Education: Fitness, Wellness and Nutrition, Khel Sahitya Kendra Publishers and Distributors, New Delhi.
6. Govindarajulu, N., (2005) Management of Physical Education and Sports Programme, Friends Publications, India.
7. Miller, D.K. & Allen T.E., (1 September, 1989) Fitness: A Lifetime Commitment, Macmillan Publishers, USA.

SUGGESTED READING:

1. Jensen C. and Naylor J. (2005). "Opportunities in Recreation and Leasure Sports" McGraw Hill. Publishers. New York. U.S.A.
2. V.V. Hunt, "Recreation for the Handicapped" Prentice Hall inc., 1974
3. Chelladurai. P (1999) "Human Resource Management in sport and Recreation", Human kinetics.
4. K. Chandrashekar "Sports Administration" Vinek Thani Khel Sahitya Kendra pub., (2004)

5. Willgoose, C.E. (1979). "Curriculum in Physical Education" 3rd Ed. Englewood Cliffs.: N.J. Prentice Hall, Inc
6. "Greenbelt Recreation Activity Guide-Fall 2018" (Aug 17, 2018), City of Greenbelt
7. Mood Dale, Frank Musker, Judith Rink, (February 23, 2011), "Sports and Recreational Activities" McGraw-Hill Education; 15 edition, ISBN-10: 0078022487
8. Nanda, S.M. Sports Management, Friend Publications, New Delhi.
9. Paul, A. Sarirsikshay Management, Classic Publishers, Kolkata.
10. Bucher, C. A. Administration of Physical Education and Athletic Programme. St. Louis: The C.V. Mosby Co.
11. Broyles, F. J. & Robert, H. D. Administration of Sports, Athletic Programme: A Managerial Approach. New York: Prentice Hall Inc

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

i. ***Formative Assessment*:** 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*:** 50 marks

c) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

d) Three Long Questions to be answered out of six set from higher order of RBT – (30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDVAC5
Course Title	Sports for Life
Credits	1
Total Hours	30
Hours per Week	3
Course Type	Value Added Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: a. Covers the Fundamental skills and rules of the Selected Sport. b. Gives an exposure of match practice with the application of rules of the various games.
Prerequisite	Basic knowledge on Sports.
Course Objectives	A student will be able to: 1. Analyse the significance of sports to promote health, fitness, and wellness in life. 2. Relate the values of teamwork, tolerance, goal-setting, and decision making. 3. Design the strategies and tactical moves while playing a sport. 4. Evaluate the importance of physical activity in reference to 3S: strength, speed, and suppleness.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Recall the History of the Game	R
CO2	Explain the rules and their interpretation of the Game	U
CO3	Demonstrate the Fundamental Skills of the Game.	A1
CO4	Examine the duties of the Officials	A2
CO5	Rate the execution of fundamental skills of the Game.	E
CO6	Construct the various playfields with correct markings.	C
CO7	Replicate the basic skills of the game	I
CO8	Re-create the fundamental skills of the game.	M
CO9	Demonstrate the fundamental skills during the game.	P
CO10	Teach the fundamental skills of the game	A
CO11	Design the fundamental skills of the game.	N

Course Content

Units	Content	Lecture Hours	COs	RBT

Unit I	**FOOTBALL** **A. <u>Session 1 -</u> History of the Game** **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. . <u>Session 9-14</u> Fundamental Skills:** • **Kicking:** Kicking the ball with inside of the foot, kicking the ball with Full Instep of the foot, kicking the ball with Inner Instep of the foot,kicking the ball with Outer Instep of the foot and Lofted Kick. • **Trapping:** Trapping- the Rolling ball, and the Bouncing ball with sole ofthe foot. • **Dribbling:** Dribbling the ball with Instep of the foot, dribbling the ballwith Inner and Outer Instep of the foot. • **Heading**: In standing, running, and jumping condition. • **Throw-in:** Standing throw-in and Running throw-in. • **Feinting**: With the lower limb andupper part of the body. • **Tackling**: Simple Tackling, Slide Tackling. • **Goal Keeping**: Collection of Ball,Ball clearance- kicking, throwing, and deflecting. **E. <u>Session 15</u>: Game practice** with application of Rules and Regulations.	**30**	**CO1** **CO2** **CO3** **CO4** **CO5** **CO6** **CO7** **CO8** **CO9**	**R** **U** **A1** **A2** **E** **C** **I** **M** **P** **A** **N** **P**
Unit II	**BASKETBALL** **A. <u>Session 1 -</u> History of the Game** **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. Fundamental Skills:**	**30**	**CO1** **CO2** **CO3** **CO4** **CO5**	**R** **U** **A1** **A2** **E** **C** **I**

	• **Passing**: Two hand Chest Pass, two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass. • **Receiving**: Two hand receiving, one hand receiving, receiving in stationary position, receiving while Jumping and Receiving while Running. • **Dribbling**: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. • **Shooting**: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw. • **Rebounding**: Defensive rebound and Offensive rebound. • **Individual Defence**: Guarding the player with the ball and without the ball, Pivoting. **E. <u>Session 15:</u> Game practice with application of Rules and Regulations**		**CO6 CO7 CO8 CO9**	**M P A N P**
Unit III	**ATHLETICS** **A. <u>Session 1 -</u> History of the Game** **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. . Basic skills and techniques of Athletic Events: (Any One)** • **Running Events:** sprint races, middle- and long-distance races, hurdles races • **Jumping Events-** long jump, Triple Jump and High Jump. • **Throwing Events-** Shot put, Discus throw. **E. <u>Session 15:</u> Game practice with application of Rules and Regulations**	**30**	**CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9**	**R U A1 A2 E C I M P A N P**

LEARNING RESOURCES:

1. Sharma, N.P., (2005) Fundamental of Track and Field, Khel Sahitya Kendra, New Delhi, India.
2. Striano, P & DC., (2013) Anatomy of Running: A Guide to Running Right, Hinkler Publishers, UK.
3. Kaur, B., (2020) Officiating and Coaching, Sports Publication, New Delhi.

4. Jain, R., (2012) Play and Learn Track and Field, Khel Sahitya Kendra, New Delhi.
5. Mitra, S., Das, P.K & Bandyopadhayay, N., (2022) Basics of Basketball for Teaching and Coaching Courses, Akansha Publishing House, Darya Ganj, Delhi.
6. Srivastava, A.K., (2010) Book of Rules of Games and Sports, Sports Publication, New Delhi.
7. Jange, H.S. & Pasodi, M.S., (1 January 2018) Officiating and Coaching in Physical Education and Sports, Khel Sahitya Kendra, New Delhi.
8. Hohenstein, M., (1 February, 2000) Games, Bethany House Publishers, a division of Baker Publishing Group, Minnesota, US.

SUGGESTED READING:

1) Mahaboobjan, A., and Viswejan, U. (2021) Rules and Measurements in sports and games, Sports Publication (First Edition), New Delhi.
2) Bain, R., (2019) Rule Book of Games: Football, Alpha Editions.
3) Hawkins, V., (2018) Rule Book of Games: Basketball, Alpha Edition.
4) Singh, A.K., (2022) Basketball- Complete Guide Book – (First Edition), Sport Publication, New Delhi.
5) Amateur Athletic Union of the United States, (2010), Official Athletic Rules and Official Handbook, Nabu Press.
6) Pluff, G.E., (1 January, 2013) The A-Z Basketball Book: What Every Player Needs to Know to be Great at the Game, Zaccheus Entertainment.

Singh, L., (2021) Track & Field Rules and Regulations, Khel Sahitya Kendra, New Delhi.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

Log Books to be maintained and recorded for individual students for formative assessment.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDVAC101
Course Title	ORGANISATION AND MANAGEMENT IN SPORTS
Credits	1
Total Hours	30
Hours per Week	2
Course Type	VAC
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Professional Ethics
Course Offered to	Sports Management
Regulation	2023
Course Overview	This course: a. Covers the basic concepts of Organisation Behaviour. b. Clear the concepts of sports management. c. Inbuilt the quality of sports Leadership d. Marking the International standard (400 m) running Track
Prerequisite	Basic knowledge on Organisation and Behaviour.
Course Objectives	A student will be able to: 1. Quote the meaning, definitions of Organisation Behaviour. 2. Outline the need of Physical Education in modern living. 3. Explain the concept of management in sports. 4. Outline the quality, role, responsibility, and personality of leaders. 5. Design the international standard Athletic track.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Describe the concepts of Organisation Behaviour and Individual Behaviour	R
CO2	Discuss the various styles and theories of Leadership.	U
CO3	Apply the principles of Sports Management	A1
CO4	Examine the need of Physical Education in modern living.	A2
CO5	Evaluate the correct measurements of Athletic Track Marking.	E
CO6	Manage Sports tournaments and events in Schools and Colleges.	C

Course Content

Units	Content	Lecture Hours	Cos	RBT
Session 1	Organization Behaviour meaning and its concepts.	**2**	**CO1**	**R U A1 A2**

				E C
Session 2	Organisation Behaviour meaning and its concepts.	**2**	**CO1**	**R U A1 A2 E C**
Session 3	Individual behaviour – Ability, Learning, Values, Attitudes, Personality.	**2**	**CO1**	**R U A1 A2 E C**
Session 4	Individual behaviour – Ability, Learning, Values, Attitudes, Personality.	**2**	**CO1**	**R U A1 A2 E C**
Session 5	Trait Theories of Leadership.	**2**	**CO2**	**R U A1 A2 E C**
Session 6	Leadership Styles and Situational theories of Leadership.	**2**	**CO2**	**R U A1 A2 E C**
Session 7	Concept of Sports Management.	**2**	**CO3**	**R U A1 A2 E C**
Session 8	Management in Physical Education and Sports.	**2**	**CO3**	**R U A1 A2 E C**

Session 9	Management in Physical Education and Sports.	**2**	**CO3**	**R U A1 A2 E C**
Session 10	Types of tournaments, preparing fixture of different types of tournaments.	**2**	**CO6**	**R U A1 A2 E C**
Session 11	Physical Education in our daily life.	**2**	**CO4**	**R U A1 A2 E C**
Session 12	Need of Physical Education in Modern living.	**2**	**CO4**	**R U A1 A2 E C**
Session 13	Method of Calculation of Athletic track (practical).	**2**	**CO5**	**R U A1 A2 E C**
Session 14	Track Marking	**2**	**CO5**	**R U A1 A2 E C**
Session 15	Track Marking	**2**	**CO5**	**R U A1 A2 E C**

LEARNING RESOURCES:

1. Govindarajulu, N., (2005) Management of Physical Education and Sports Programme, Friends Publications, India.
2. Thour, M., (2006) Camping Management in Physical Education, Friends Publications, India.
3. Singh, Y., (2005) Sports Management, Sports Publication, New Delhi.

4. Chelladurai, P & Kerwin, S., (2017) Human Resource Management in Sport and Recreation, Human Kinetics, US.

SUGGESTED READINGS:

1. Andin Carment Tabije"Organization and Management of Physical education and Sports" Rex book store, Philippines
2. Barnhill.R. Christopher.,Smith.l. Natalie.& Oja.D. Brent."Organizational Behavior in sports management" 2021.
3. Dr. Rathore Vishan, " Administration & Organisation in physical education" khel sahitya Kendra 2013.
4. Mishra.S.C "Organization in physical education" khel sahitya Kendra 2005.

2. Assessment:

Log Books to be maintained and recorded for individual students for formative assessment.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Rakesh Saibo **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDMIN102
Course Title	Management of Physical Education and Sports
Credits	4
Total Hours	75
Hours per Week	5
Course Type	Minor
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Professional Ethics
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: 1. Know sports management and employ principles of strategic planning, and financial and human resource management. 2. Develop overall traits of leadership and personality. 3. Develop critical thinking in analysing sport management issues and in managerial planning and decision making. 4. Gives to keen observation about the budget. 5. Able to organize events and sports tournaments.
Prerequisite	Basic knowledge of Event management and Sports.
Course Objectives	A student will be able to: 1. Quote the meaning, definitions, principles, and scope of Sports Management. 2. Analyse the concepts of Leadership and Personality in Sports Management. 3. Apply the principles of strategic planning, and financial and human resource management. 4. Examine the importance of management and planning in sports. 5. Critique the sport management issues and managerial planning and decision making in Sports.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Write the importance, Scope, Principles and Management of Physical Education and Sports Programs	R
CO2	Explain the concept of Leadership in Physical Education and Sports	U
CO3	Apply the management principles in Physical Education programs and Games & Sports meets.	A1
CO4	Organise physical Education programs and Games & Sports meets in School, College, and University	A2

CO5	Discriminate between various forms of Leadership	E
CO6	Formulate a report on visit or participation to standard tournaments, competitions, and Adventure Sports.	C
CO7	Replicate the techniques of Racket Sports	I
CO8	Perform correct skills of Racket Sports.	M
CO9	Demonstrate correct Racket Sports techniques.	P
CO10	Teach correct skills and techniques of Racket Sports.	A
CO11	Design proper technical sessions of Racket Sports.	N

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**INTRODUCTION** a. Meaning, Definition, Scope, and Principles of Management in Physical Education and Sports. b. Intramural and Extramural competitions – Aims and Objective c. Management of Events, Equipment and Play Fields in Physical Education and Sports.	**15**	**CO1**	**R U A1 A2 E C**
Unit II	**LEADERSHIP IN PHYSICAL EDUCATION AND SPORTS** a. Meaning, Definition, importance, and principles of Leadership. b. Forms of Leadership (Autocratic, Laisser-faire, Democratic, Benevolent Dictator c. Qualities of good leader.	**15**	**CO2 CO5**	**R U A1 A2 E C**
Unit III	**ORGANISATION OF TOURNAMENTS AND SPORTS PROGRAM** a. Meaning, Definition, Importance, and types of Tournaments. b. Procedure of Drawing Fixture, merits, and demerits of Knock-out, League and Combination Tournaments. c. Management and Planning of Games & Sports meets in School, College, and University.	**15**	**CO3 CO4**	**R U A1 A2 E C**
Unit IV	**FIELD PRACTICAL** **a. Racket Sports** i. Badminton • Fundamental Skills • Playfield Technology – Marking and Construction of the playfields	**30**	**CO6 CO7 CO8 CO9 CO10**	**I M P A**

	• Rules and their interpretations and duties of the officials OR ii. Table Tennis • Fundamental Skills • Playfield Technology – Marking and Construction of the playfield • Rules and their interpretations and duties of the officials b. **Project**: Organise a standard tournament or competition. Record Book to be maintained.		**CO11** **CO6** **CO7** **CO8** **CO9** **CO10** **CO11** **CO6**	**N** **I** **M** **P** **A** **N** **C**

LEARNING RESOURCES:

1) Govindarajulu, N., (2005) Management of Physical Education and Sports Programme, FriendsPublications, India.
2) Thour, M., (2006) Camping Management in Physical Education, Friends Publications, India.
3) Singh, Y., (2005) Sports Management, Sports Publication, New Delhi.
4) Chelladurai, P & Kerwin, S., (2017) Human Resource Management in Sport and Recreation,Human Kinetics, US.
5) Kaur, B., (2020) Officiating and Coaching, Sports Publication, New Delhi.
6) Srivastava, A.K., (2010) Book of Rules of Games and Sports, Sports Publication, New Delhi.
7) Jange, H.S. & Pasodi, M.S., (1 January 2018) Officiating and Coaching in Physical Education and Sports, Khel Sahitya Kendra, New Delhi.
8) Hohenstein, M., (1 February, 2000) Games, Bethany House Publishers, a division of Baker Publishing Group, Minnesota, US.

SUGGESTED READING:

1) Nanda, S.M. Sports Management, Friend Publications, New Delhi.
2) Paul, A. Sarirsikshay Management, Classic Publishers, Kolkata.
3) Bucher, C. A. Administration of Physical Education and Athletic Programme. St. Louis: The C.V. Mosby Co.
4) Broyles, F. J. & Robert, H. D. Administration of Sports, Athletic Programme: A Managerial Approach. New York: Prentice Hall Inc
5) Pandy, L.K. (1977). Methods in Physical Education.Delhe: Metropolitan Book Depo.
6) Sharma, V.M. & Tiwari, R.H.: (1979). Teaching Methods in Physical Education. Amaravati: Shakti Publication
7) Kar, S. & Santra, D.C. (2018): Santak Sarirsiksha Porichaya (Vol.-1), Santra Publication, Kolkata.
8) Kamlesh, M.L., (2016) Management Concepts in Physical Education and Sports, Khel Sahitya Kendra, New Delhi.
9) Northouse, P.G., (2021) Leadership: Theory and Practice, (ninth edition), Sage Pubns.
10) Martenik, T., & Hellison, D., (2015) Youth Leadership in Sports and Physical Education, (first edition), Palgrave Macmillan, New York.
11) Mahaboobjan, A., and Viswejan, U. (2021) Rules and Measurements in sports and games, Sports Publication (First Edition), New Delhi.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

i. ***Formative Assessment*:** 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*:** 50 marks (25 Marks Theory + 25 Marks Practical)
Theory (50 Marks Exam to be converted to 25 Marks):

a) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

b) Three Long Questions to be answered out of six set from higher order of RBT – (30 Marks).
Summative Assessment Time: 2 Hours for pen and paper test

Practical (50 Marks Exam to be converted to 25 Marks):

SL. No.		
1	Lab. Note Book	10
2	Viva-voce	10
3	Practical	30
TOTAL		**50**

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDMDC102
Course Title	Health and Fitness Education
Credits	3
Total Hours	45
Hours per Week	3
Course Type	Multi-Disciplinary Course
Semester	II
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: • Covers the basic concepts of Health Education and Test & Measurements in Physical Education. • Discusses the nutritional requirements for daily living and balanced diet. • Gives an exposure to the concepts and management of Sports Injuries. • Studies the various methods of Measurement of Body Composition and Fitness.
Prerequisite	Basic knowledge on Sports, Fitness and Recreation.
Course Objectives	A student will be able to: 1. Describe the concepts and principles of Health and Health Education. 2. Indicate the Nutritional requirements for daily living of an individual. 3. Apply the principles of First Aid and Management of Sports Injuries. 4. Discuss the different types of Postural Deformities. 5. Examine the concepts of Body Composition Assessments and Fitness Tests. 6. Analyse the Body Composition and Fitness Levels of different individuals.

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Describe the concept and principles of Health and Health Education	R
CO2	Restate the nutritional requirements for daily living and health disorders due to its deficiencies.	U
CO3	Show the techniques of measurement of Body Compositions and Somatotype Assessment	A1
CO4	Examine the various types of Sports Injuries and Postural Deformities.	A2
CO5	Evaluate various components of Physical Fitness using scientific Fitness Tests	E
CO6	Plan a Balanced Diet Chart.	C

Course Content

Units	Content	Lecture Hours	COs	RBT
Unit I	**INTRODUCTION** a. Concept, definition, and dimension of Health. b. Definition, aim, objectives and principles of Health Education. c. Nutrition- Nutritional requirements for daily living. d. Balance Diet. Health disorders due to deficiencies of Vitamins and Minerals.	**12**	**CO1 CO2 CO6**	**R U A1 A2 E C**
Unit II	**HEALTH AND FIRST-AID MANAGEMENTS** a. First aid- Meaning, definition, importance. b. Management of sports injuries- Sprain, Strain, Facture and Dislocation. c. Postural deformities- Causes and corrective exercise of Kyphosis, Lordosis, Scoliosis, Knock Knees, and Flat Foot.	**12**	**CO4**	**R U A1 A2 E C**
Unit III	**MEASUREMENT OF BODY COMPOSITIONS AND SOMATOTYPE ASSESSMENT** a. Body Mass Index (BMI)- Concept and method of measurement. b. Body Fat and Lean Body Mass (LBM) - Concept and method of measurement. c. Somatotype – Concept and meaning.	**12**	**CO3**	**R U A1 A2 E C**
Unit IV	**FITNESS TEST (Any 2)** a. Yo-Yo Fitness Test b. AAHPER Youth Fitness Test c. Harvard Step Test d. Queen's College Step Test	**12**	**CO5**	**R U A1 A2 E**

LEARNING RESOURCES:

1. Nathial, M.S., (2009) Sports, Health and Physical Education, Khel Sahitya Kendra, New Delhi.
2. Bijlani, R., (2015) Back to Health Through Yoga, Rupa & Co; First Edition, New Delhi.
3. Kansal, D.K., (2012) Practical Approach to Test, Measurement and Evaluation, SSS Publication, Bengaluru, Karnataka.
4. Arora, S., Agarwal M & Gupta B., (2019) Fitness, Wellness and Nutrition, KSK Publishers & Distributors, New Delhi.
5. Charless, H.M., (2004) Tests and Measurement in Health in Physical Education, Friends Publications, India.
6. Miller, D.K., & Allen T.E., (1990) Fitness: A Lifetime Commitment, Macmillan Publishers, New York, US.
7. Daniels, P., & Restak R.MD., (2014) The Body: A Complete User's Guide, National Geographic Publisher, Washington, DC.

SUGGESTED READING:

1. Wasuja, M., (2017) Health Education and Sports Nutrition, Friends Publications (India).

2. Punnya, L.I., (2017) Physical Fitness and Wellness (First Edition), Khel Sahitya Kendra, New Delhi.
3. Thakare, A.P., (2018) Test, Measurement and Evaluation in Physical Education, Sports Publication, New Delhi.
4. Sharma, S.K., (2018) Test, Measurement and Evaluation in Physical Education, Friends Publications, India.
5. Srilakshmi, B., Suganthi, V. & Ashok, C.K., (2016) Exercise Physiology Fitness and Sports Nutrition, (First Edition) New Age International Private Limited.
6. Sangangouda, K., Allaudin, M. & Pasodi, M.S., (2018) Sports Nutrition, Khel Sahitya Kendra, New Delhi.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

i. ***Formative Assessment*:** 50 marks as per Assessment & Evaluation Framework Document of Salesian College

ii. ***Summative Assessment*:** 50 marks

c) Four Short Questions to be answered out of eight given from lower order of RBT – (20 Marks)

d) Three Long Questions to be answered out of six set from higher order of RBT – (30 Marks). Summative Assessment Time: 2 Hours for pen and paper test

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDVAC7
Course Title	Sports for Life
Credits	1
Total Hours	30
Hours per Week	3
Course Type	Value Added Course
Semester	I
Intended Level	Certificate
Issue(s) Addressed	Human Values
Course Offered to	Physical Education
Regulation	2023
Course Overview	This course: a. Covers the Fundamental skills and rules of the Selected Sport. b. Gives an exposure of match practice with the application of rules of the various games.
Prerequisite	Basic knowledge on Sports.
Course Objectives	A student will be able to: 1. Analyse the significance of sports to promote health, fitness, and wellness in life. 2. Relate the values of teamwork, tolerance, goal-setting, and decision making. 3. Design the strategies and tactical moves while playing a sport. 4. Evaluate the importance of physical activity in reference to 3S: strength, speed, and suppleness.

Course Outcomes based on RBT and Cognitive Level Mapping

At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Recall the History of the Game	R
CO2	Explain the rules and their interpretation of the Game	U
CO3	Demonstrate the Fundamental Skills of the Game.	A1
CO4	Examine the duties of the Officials	A2
CO5	Rate the execution of fundamental skills of the Game.	E
CO6	Construct the various playfields with correct markings.	C
CO7	Replicate the basic skills of the game	I
CO8	Re-create the fundamental skills of the game.	M
CO9	Demonstrate the fundamental skills during the game.	P
CO10	Teach the fundamental skills of the game	A
CO11	Design the fundamental skills of the game.	N

Course Content

Units	Content	Lecture Hours	Cos	RBT
Unit I	**HANDBALL**	**30**		**R**

	A. <u>Session 1 -</u> History of the Game **B. . <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C. . <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D. . <u>Session 9-14</u> Fundamental Skills:** • Catching, Throwing and Ball control • Goal Throws: Jump shot, Centre shot, Dive shot, Reverse shot. • Dribbling: High and low. • Attack and counter attack, simple counter attack, counter attack from two wings and center. • Blocking, Goalkeeping and Defensive skills. **E. Session 15 Game practice with application of Rules and Regulations.**		**CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9 CO10 CO11**	**U A1 A2 E C I M P A N P**
Unit II	**VOLLEYBALL** **A) <u>Session 1 -</u> History of the Game** **B)) <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C)) <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D)) Fundamental skills:** • **Service:** Under arm service, Side arm service, Tennis service, Floating service. • **Pass:** Under arm pass, Overhead pass. • **Spiking and Blocking**. **F. Game practice with application of Rules and Regulations.**	**30**	**CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9 CO10 CO11**	**R U A1 A2 E C I M P A N P**
Unit III	**INDOOR GAMES:** **Badminton** **A) <u>Session 1 -</u> History of the Game** **B)) <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C)) <u>Session 6-8</u> Rules and their**	**30**	**CO1 CO2 CO3 CO4 CO5 CO6**	**R U A1 A2 E C**

	interpretation and duties of officials. **D) Fundamental Skills** • **Basic Knowledge:** Various parts of the Racket and Grip • **Service:** Short Service, Long Service, Long-high Service. • **Shots:** Over Head Shot, Defensive Clear Shot, Attacking Clear Shot, Drop Shot, Net Shot, Smash. **E) Game Practice with applications of Rules and regulations** **OR** **Table Tennis** **A) <u>Session 1 -</u> History of the Game** **B) <u>Session 2-5</u> Playfield Technology – Marking and Construction of the playfields** **C) <u>Session 6-8</u> Rules and their interpretation and duties of officials.** **D) <u>Session 9-14</u> Fundamental Skills** • **Basic Knowledge:** various parts of the Racket and Grip (Shake Hand & Pen Hold Grip) • Stance: Alternate & Parallel • **Push and Service:** Backhand & Forehand • **Chop:** Backhand & Forehand • **Receive:** Push and Chop with both Backhand & Forehand **E) Game Practice with applications of Rules and regulations.**		**CO7** **CO8** **CO9** **CO10** **CO11** **CO1** **CO2** **CO3** **CO4** **CO5** **CO6** **CO7** **CO8** **CO9** **CO10** **CO11**	**I** **M** **P** **A** **N** **P** **R** **U** **A1** **A2** **E** **C** **I** **M** **P** **A** **N** **P**

LEARNING RESOURCES:

1. Srivastava, A.K., (2010) Book of Rules of Games and Sports, Sports Publication, New Delhi.
2. Daniels, P., & Restak R.MD., (2014) The Body: A Complete User's Guide, National Geographic Publisher, Washington, DC.
3. Jackson, L. Jr., (2014) Racket Wars: Guide Book to all the World's Racket Sports, First Edition, BookBaby Publishers.

SUGGESTED READING:

1. Mahaboobjan, A., and Viswejan, U. (2021) Rules and Measurements in sports and games, Sports Publication (First Edition), New Delhi.

2. Bain, R., (2019) Rule Book of Games: Football, Alpha Editions.
3. Hawkins, V., (2018) Rule Book of Games: Volleyball, Alpha Edition.
4. Singh, A.K., (2022) Volleyball- Complete Guide Book – (First Edition), Sport Publication, New Delhi.
5. Tyson, P & Turman J., (1987) The Handball Book, Human Kinetics Publishers, Canada.
6. McAfee, R.E., (2009) Table Tennis; Steps to Success, Human Kinetics Publishers, Canada.
7. Rai G., (2016) The Art of Table Tennis, Sports Publications, New Delhi.
8. Weatherford, L., (2018) Rule Book of Games: Badminton, Alpha Editions, Ansari Road, New Delhi.
9. Srivastava, A.K., (2009) Badminton Rule Book, Sports Publication, New Delhi.
10. Singh, A.K., (2022) Volleyball: A Complete Guide Book, Sports Publication, New Delhi.
11. Thani, L., (2007) Skills & Tactics; Football Book, Sports Publication, New Delhi.

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

Log Books to be maintained and recorded for individual students for formative assessment.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Wilson Bara **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

1. Course Description

Course Code	23PEDVAC102
Course Title	CONTEMPORARY ISSUES IN SPORTS
Credits	1
Total Hours	30
Hours per Week	2
Course Type	VAC
Semester	II
Intended Level	Certificate
Issue(s) Addressed	Professional Ethics
Course Offered to	Sports Management
Regulation	2023
Course Overview	This course: a. Covers the Psychological aspect of sports. b. Gives an exposure of Anatomical body structure of sports persons. c. Gives knowledge about different type of sports training.
Prerequisite	Basic knowledge on contemporary issues in Sports.
Course Objectives	A student will be able to: 1. Identify the psychological aspects of Sports Training. 2. Discuss the Anatomical and Physiological functions and structure of sports person. 3. Distinguish between the Anatomical and Physiological characteristics of male & female. 4. Apply the concepts and principles of different type of sports training 5. Restate the specific major games' rules and their interpretation and duties of officials

Course Outcomes based on RBT and Cognitive Level Mapping
At the end of this course, a student will be able to:

COs	Statements	Cognitive Level Mapping
CO1	Describe the meaning and concepts of Sports Psychology, Anatomy and Physiology	R
CO2	Discuss the need and importance of Psychology in Sports	U
CO3	Apply the concept and principles of Sports Training	A1
CO4	Differentiate between the anatomical and physiological features of Male & Female	A2
CO5	Evaluate the various training methods	E
CO6	Design training programs for developing the various components of fitness.	C
CO7	Replicate the basic skills of the game	I
CO8	Re-create the fundamental skills of the game.	M
CO9	Demonstrate the fundamental skills during the game.	P
CO10	Teach the fundamental skills of the game	A
CO11	Design the fundamental skills of the game.	N

Course Content				
Units	**Content**	**Lecture Hours**	**Cos**	**RBT**
Session 1	Sports psychology.	**2**	**CO1**	**R U A1 A2 E C**
Session 2	Need and importance of Psychology in sports.	**2**	**CO2**	**R U A1 A2 E C**
Session 3	Attention and Interest	**2**	**CO3**	**R U A1 A2 E C**
Session 4	Anatomy and Physiology in Sports.	**2**	**CO4**	**R U A1 A2 E C**
Session 5	Human Skeleton System.	**2**	**CO1**	**R U A1 A2 E C**
Session 6	Anatomical sex difference.	**2**	**CO5**	**R U A1 A2 E C**
Session 7	Muscular System and the Nervous System.	**2**	**CO1**	**R U A1 A2 E C**

Session 8	Central and Autonomic Nervous System.	**2**	**CO1**	**R U A1 A2 E C**
Session 9	Concepts and Principles of Sports Training.	**2**	**CO5**	**R U A1 A2 E C**
Session 10	Motor fitness and its components.	**2**	**CO6**	**R U A1 A2 E C**
Session 11	Different exercises for developing the various components.	**2**	**CO5 CO6**	**R U A1 A2 E C**
Session 12	Different types of training method (Fartlek training, Interval training, Circuit training).	**2**	**CO5 CO6**	**R U A1 A2 E C**
Session 13	Major Specific Game (Practical).	**2**	**CO7 CO8 CO9 CO10 C11**	**I M P A N**
Session 14	Major Specific Game (Practical).	**2**	**CO7 CO8 CO9 CO10 C11**	**I M P A N**

Session 15	Major Specific Game (Practical).	**2**	**CO7 CO8 CO9 CO10 C11**	**I M P A N**

LEARNING RESOURCES:

1. Srivastava, A.K., (2010) Book of Rules of Games and Sports, Sports Publication, New Delhi.
2. Daniels, P., & Restak R.MD., (2014) The Body: A Complete User's Guide, National Geographic Publisher, Washington, DC.
3. Jackson, L. Jr., (2014) Racket Wars: Guide Book to all the World's Racket Sports, First Edition, BookBaby Publishers.

SUGGESTED READINGS:

1. Brar Mandeep kaur "Sports Psychology",Punjab education board 2018.
2. Dr. Dagar R.K.S & Dr. Chauhan Shiv Kumar "sports psychology & sociology", Friends publication India 2020.
3. Perry John, "Sports Psychology a complete introduction" Hachette UK 2016.
4. Dr. uppal A.k "Principles of Sports Training", friends publication.2020.
5. Dr. nathial Mandeep Singh "Anatomy and Physiology of physical education" friends publication.2020.
6. Dr. Mishra sharad Chandra "Physiology in sports" sports publication India 2006.
7. Dr. Lega Sushil, " Anatomy & Physiology" sports publication, India 2020

R: Remembering, U: Understanding, A1: Applying, A2: Analysing, E: Evaluating, C: Creating

2. Assessment:

Log Books to be maintained and recorded for individual students for formative assessment.

Course Faculty (Prepared by)	**Head of the Department** (Checked and verified by)	**Dean** (Approved by)
Name: Mr. Rakesh Saibo **Signature:**	**Name:** Mr. Wilson Bara **Signature:**	**Name:** Mr Ravi Bhushan Singh **Signature:**

Salesian College Siliguri (Autonomous)

Department of Political Science

Value Added Course (VAC)

Political Debates: Issues and Concerns

Total Hours: 30

Sessions: 15 (2 hours each)

Credits: 1

Objectives

The Value added Course of **Political Debates: Issues and Concerns** aims to inculcate the skills of critical thinking, research and public speaking among the students. This will enable leadership skills, the art of debate, discussion and negotiation which is an integral component of the discipline of Political Science. The course intends to encourage students to take debate as a positive form of human interaction shaping the course of policy making/decision making in a polity.

Detailed Module

Session 1:	**Understanding Debates and Discussion**: Students will learn the importance of debates and discussions in politics. For this purpose some open group discussions on contemporary issues will be conducted. Students will also be taught the rules, techniques of debates and rebuttal.
Session 2:	**Debate Topic:** Reservation policy in India
Session 3:	**Debate Topic:** Caste and Politics
Session 4:	**Debate Topic:** Regionalism in India
Session 5:	**Debate Topic:** Uniform Civil Code
Session 6:	**Debate Topic:** One Nation, One Election
Session 7:	**Debate Topic:** Article 370

Session 8:	**Debate Topic:** LGBTQA+
Session 9:	**Debate Topic:** New Education Policy
Session 10:	**Debate Topic:** Russia –Ukraine crisis
Session 11:	**Debate Topic:** Human Rights
Session 12:	**Debate Topic:** Women reservation policy in India
Session 13:	**Debate Topic:** Sustainable Development
Session 14:	**Debate Topic:** Media and Politics
Session 15:	**Debate Topic:** Globalization and State

Mode of Evaluation: Practical

Course Code	**23ENGVAC101**
Course Title	**Remedial Grammar**
Credits	**3**
Lecture Hours	**45**
Hours/Week	**3**
Category	**Value Added Course (COP-Communicative English)**
Semester	**I**
Regulation	**2023**

Course Objectives:

Students will be able to

1. To enhance the comprehension, reading, writing and speaking skills of the students.
2. Provide with a thorough understanding of Basic English grammar and construction.
3. To introduce corrective measure to the students.

Prerequisites: Understanding and writing English in proper and formal ways.

Syllabus

Units	Contents	Hours	COs	RBT	Methods Used
I	**Remedial Grammar** 1. Nouns; Pronouns 2. Articles 3. Verb and adverb 4. Uses of Tenses 5. Prepositions	9	**CO1** **CO2**	**R, U, A, C**	**Lectures, PPTs, Writing exercises, Peer Teaching**
II	1. Letter writing 2. Report writing 3. Notice writing 4. Paragraph writing	6	**C03**	**A, C**	**Lectures, PPTs, Writing exercises, Peer Teaching**

Learning Resources:

1. Wood, F. T. (1968) *A Remedial English Grammar for Foreign Students.* Macmillan

Course Outcomes (COs)and Cognitive Level Mapping

At the end of the course the students will be able to:

COs	Statements	Bloom's Level
CO1	Understand basic English grammar and sentence construction.	**R, U, E, A, C**
CO2	Eradicate grammatical errors in speech and writing.	**R, U, E, A, C**
CO3	Enable the students to acquire the writing skills.	**R.U.E.A.C**

Course Code	**23ENGVAC102**
Course Title	**Writing skills**
Credits	**3**
Lecture Hours	**45**
Hours/Week	**3**
Category	**Value Added Course (COP-Communicative English)**
Semester	**I**
Regulation	**2023**

Course Objectives:

Students will be able to

1. To enhance the comprehension, reading, writing and speaking skills of the students.
2. Provide with a thorough understanding of Basic English grammar and construction.
3. Help the students with communication.

Prerequisites: Understanding and writing English in proper and formal ways.

Syllabus

Units	Contents	Hours	COs	RBT	Methods Used
I	1.Comprehension of poetry 2.Comprehension of prose	6	**CO1** **CO2**	**R, U, A, C**	**Lectures, PPTs, Writing exercises, Peer Teaching**
II	Figures of speech- 1.Simile 2.Metaphor 3.Oxymoron 4.Personification	9	**C03**	**A, C**	**Lectures, PPTs, Writing exercises, Peer Teaching**

Learning Resources:

1. Wood, F. T. (1968) *A Remedial English Grammar for Foreign Students.* Macmillan
2. Krishnaswami, N (2007) *Modern English.* Macmillan India.

Course Outcomes (COs)and Cognitive Level Mapping

At the end of the course the students will be able to:

COs	Statements	Bloom's Level
CO1	To enhance the comprehension, reading and writing skills of the students.	**R, U, E, A, C**
CO2	Enable the students to acquire the writing skills.	**R, U, E, A, C**
CO3	Understanding the figurative aspect of the language.	**R.U.E.A.C**