



MAHARAJA INSTITUTE OF TECHNOLOGY MYSORE
Autonomous Institution Affiliated to VTU

Competency Based Syllabus (CBS)
for
Computer Science & Business System (CS&BS)
(Under Outcome Based Education (OBE) and
Choice-Based Credit System (CBCS))

Offered from 7th to 8th Semesters of Study
In
Partial Fulfillment for the Award of Bachelor's Degree in

Computer Science and Business System
2023 Scheme

Scheme Effective from the academic year 2023-24

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7th Semester	Management Sciences(MS) Management and Entrepreneurship	M23BCS701
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1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Management skills	How the Brain Processes Information to Make Decisions: Reflective and Reactive Systems
2.	Critical Thinking Case	New Management Challenges for the New Age.
3.	Decisional roles	The responsibility of making decisions on behalf of both the organization and the stakeholders with an interest in it.
4.	Determination	Entrepreneurs look at defeat as an opportunity for success. They are determined to make all of their endeavors succeed,
5.	Creativity	Entrepreneurs will repurpose products to market them to new industries.

2. Competencies

S/L	Competency	KSA Description
1	Management	Knowledge: Management is how businesses organize and direct workflow, operations, and employees to meet company goals. Skills: The primary goal of management is to create an environment that empowers employees to work efficiently and productively Attitudes: Management is a dynamic function and evolves and adapts to changes in its environment, whether they are economic, socio-political or technological.
2	Administration	Knowledge: performance of supervising duties, management. Skills: Administration skills involve organization, communication, teamwork, customer service, responsibility and time management. Attitudes: It is a collaborative activity that involves writing, correspondence, and other administrative tasks. Administration is essential in both small, local organizations and large, complex enterprises.
3	Planning	Knowledge: Planning is essential for the establishment of goals, policies, and procedures for a social or economic unit Skills: Process used to develop objectives, develop tasks to meet objectives, determine needed resources, create a timeline, determine tracking and assessment, finalize the plan, and distribute the plan to the team. Attitudes: Planning is based on foresight, the fundamental capacity for mental time travel.
4	Organizing and staffing:	Knowledge: Arranging resources and tasks to implement the plan Skills: Staffing: Recruiting, selecting, evaluation and training individuals for specific roles within the organization Attitudes: Arrange and relate the work, so that it can be done efficiently by people – specifically.
5	Directing	Knowledge: Directing: Leading and motivating employees to work towards the organization's goals. Skills: The directing function of management is the process of motivating, communicating, instructing, leading, and supervising employees in order to ensure that they are working towards the accomplishment of organizational goals Attitudes: It is a continuous managerial process that goes on. Throughout the life of the organization.

6.	Entrepreneur:	<p>Knowledge: Originates from a thirteenth-century French verb, entrepreneur, meaning “to do something” or “to undertake.”</p> <p>Skills: Include various skill sets such as leadership, business management, time management, creative thinking and problem-solving.</p> <p>Attitudes: Entrepreneurs are business people who find their success by taking risks. In their pursuits, they often become disruptors in established industries.</p>
7	Small scale industries:	<p>Knowledge: In which manufacturing, providing services, productions are done on a small scale or micro scale.</p> <p>Skills: Industries that manufacture, produce and render services on a small or micro scale level.</p> <p>Attitudes: To play an active role in reducing the regional imbalances in the nation. To help in improving the standard of living for people in rural areas.</p>
8	Institutional support	<p>Knowledge: Refers to the assistance, frameworks, and resources provided by formal and informal institutions to individuals</p> <p>Skills: The organization is running various schemes to meet its objectives.</p> <p>Attitudes: Approved Colleges/Registered facilitators with objective for enhancing their Employment/ Self-Employment opportunities</p>

3. Syllabus

Management and Entrepreneurship SEMESTER – VII			
Course Code	M23BCS701	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 Hours	Total Marks	100
Credits	03	Exam Hours	03
Course Objectives:			
<ol style="list-style-type: none"> 1. Explain fundamentals management functions of a manager. Also explain planning and decision making processes 2. Explain the organizational structure, staffing and leadership process and describe the understanding of motivation. 3. Explain understanding of Entrepreneurships and Entrepreneurship development process. 4. Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur. 5. Summarize the preparation of project report, need significance of report. Also to explain about industrial ownership. 			
Module -1			
<p>Management: Introduction - Meaning - nature and characteristics of Management, Scope and Functional areas of management - Management as art or science, art or profession - Management & Administration - Roles of Management, Levels of Management,</p> <p>Planning: Nature, importance and purpose of planning process objectives - Types of plans (meaning only) - Decision making, Importance of planning - steps in planning & planning premises</p>			
Module -2			
<p>Organizing and staffing: Nature and purpose of organization, Principles of organization – Types of organization- Departmentation Committees-Centralization Vs Decentralization of authority and responsibility - Span of control - MBO and MBE (Meaning only) Nature and importance of staffing-- :Process of Selection & Recruitment (in brief).</p> <p>Directing: Meaning and nature of directing Leadership styles, Motivation, Theories, Communication - Meaning and importance - coordination, meaning and importance and Techniques of coordination.</p>			
Module -3			
<p>Entrepreneur: Meaning of Entrepreneur; Evolution of the Concept; Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur an emerging class. Concept of Entrepreneurship - Evolution of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development;</p>			
Module -4			

Small scale industries: Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI, Steps to start and SSI - Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GATT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition Only).

Institutional support: Different Schemes; TECKSOK; KIADB; KSSIDC;

Module -5

Preparation of project: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of Business Opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study.

Industrial ownership: Definition and meaning of Partnership, Characteristics of Partnership, Kinds of Partners, Partnership Agreement or Partnership Deed

Text Books:

1. Principles of Management – P. C. Tripathi, P.N. Reddy – Tata McGraw Hill.
2. Dynamics of Entrepreneurial Development & Management-Vasant Desai,Himalaya PublishingHouse.
3. Entrepreneurship Development – Poornima. M. Charantimath, Small Business Enterprises – Pearson Education - 2006 (2 & 4)

Reference Books:

1. Management Fundamentals - Concepts, Application, Skill Development – RobersLusier, Thomson.
2. Entrepreneurship Development - S. S. Khanka, S. Chand & Co. New Delhi.
3. Management - Stephen Robbins, Pearson Education/PHI - 17th Edition, 2003.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Management and Planning	Competency: Understand the basic functions managements and planning Knowledge: Management is how businesses organize and direct workflow, operations, and employees to meet company goals. Skills: The primary goal of management is to create an environment that empowers employees to work efficiently and productively.
2	Week 4-6: Organizing and staffing: Directing:	Competency: Understand the basic functions managements, committee, centralised and decentralised authority and responsibility and directing. Knowledge: Arranging resources and tasks to implement the plan. Skills: Staffing: Recruiting, selecting, evaluation and training individuals for specific roles within the organization
3	Week 8-11: Entrepreneur:	Competency: Students will be able to do, arrange and relate the work, so that it can be done efficiently and – specifically. Knowledge: Entrepreneurship usually starts as a small business but the long-term vision is much greater, to seek high profits and capture market share with an innovative new idea to reach students. Skills: Include various skill sets such as leadership, business management, time management, creative thinking and problem-solving.
4	Week 7-8: Small scale industries and Institutional support	Competency: Learn the scope and manufacturing development OF SSI and institution. Knowledge: In which manufacturing, providing services, productions are done on a small scale or micro scale. Skills: Industries that manufacture produce and render services on a small or micro scale level.
5	Week 9-12: Preparation of project and Industrial ownership	Competency: student able to understand the project identification, selection, preparation and report, and also knowledge about industrial ownership. Knowledge: Studentsable to analyse differences between single and partner ownership and Identification of Business Opportunities. Skills: manufacture produce and render services

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to management and entrepreneurship.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of management and entrepreneur activities.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency

6. Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

$$\text{Final CIE Marks} = (A) + (B)$$

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have a mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Management and Planning	Explain fundamentals management functions of a manager. Also explain planning and decision making processes, management, object and administration
2	Organizing and staffing: Directing	Explain the organizational structure, staffing and leadership process and describe the understanding of motivation about leadership style, communication, coordination and technique. Also learn the basic functions managements, committee, centralised and decentralised authority and responsibility and directing.
3	Entrepreneur:	Explain understanding of Entrepreneurships and Entrepreneurship development process and Students will be able to do, arrange and relate the work, so that it can be done efficiently and – specifically.
4	Small scale industries and Institutional support	Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur and learn the scope and manufacturing development OF SSI and institution.
5	Preparation of project and Industrial ownership	Summarize the preparation of project report, need significance of report. Also to explain about industrial ownership and students able to understand the project identification, selection, preparation and report, and also knowledge about industrial ownership.

8. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCS701.1	Explain management functions of a manager. Also explain planning and decision making processes.
M23BCS701.2	Explain the organizational structure, staffing and leadership processes and . describe the understanding of motivation
M23BCS701.3	Understanding of Entrepreneurships and Entrepreneurship development process.
M23BCS701.4	Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur.
M23BCS701.5	Summarize the preparation of project report, need significance of report.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCS701.1	3	-	-	-	-	-	-	-	-	-	3	-	3	-
M23BCS701.2	-	3	-	-	-	-	-	-	-	-	-	-	3	-
M23BCS701.3	-	-	-	-	-	-	-	-	-	-	-	-	3	-
M23BCS701.4	-	-	3	3	3	-	-	-	3	-	-	-	3	-
M23BCS701.5	-	-	3	3	-	-	-	-	3	-	-	-	3	-
M23BCS701	3	3	3	3	3	-	-	-	3	-	3	-	3	-

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject:

- ❖ **Management:** With the new start-ups and ongoing businesses, the business management field in India has witnessed a steady rise in demand for skilled managers. A business management degree can open the doors to many industries and you can climb up the hierarchy if you have the necessary skill
- ❖ **Planning:** Career planning is a lifelong process that can help you manage important life and work decisions. Consider your priorities, options, and strengths to build a plan that gets you where you want to go
- ❖ **Organizing and staffing:** The scope of a management system may include the whole of the organization, specific and identified functions of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations. By embracing emerging technologies, leveraging data-driven insights, and adopting ethical recruiting practices, recruiters can navigate the ever-changing landscape of staffing with confidence and drive better outcomes for both employers
- ❖ **Directing:** Directing is thus concerned with instructing, guiding and inspiring people in the organisation to achieve its objectives. Its important components are communication, supervision, motivation and leadership. Supervision involves seeing that subordinates perform the work as per instructions given.
- ❖ **Entrepreneur:** Entrepreneurs in the future will need to navigate the potential job displacement and automation resulting from technological advancements. This means being adaptable and continuously learning new skills to stay relevant in the changing landscape.

7th Semester	Integrated Professional Course (IPC) COMPUTATIONAL FINANCE & MODELING	M23BCB702
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Mathematical Foundations:	Basic probability theory, statistical inference, and stochastic processes.
2	Finance Knowledge:	<ul style="list-style-type: none"> • Financial Instruments: Knowledge of stocks, bonds, derivatives (options, futures, swaps), and other financial instruments. • Financial Markets: Understanding how different markets operate and how various financial instruments are traded.
3	Programming Skills:	<ul style="list-style-type: none"> • Languages: Proficiency in programming languages commonly used in finance such as Python, R, or MATLAB. • Numerical Methods: Implementation of numerical methods for solving equations, optimization, and simulations. • Data Analysis: Skills in handling, processing, and analyzing large datasets.
4	Economic Theory:	<ul style="list-style-type: none"> • Understanding of econometric models and methods to analyze financial data.
5	Analytical and Critical Thinking:	<ul style="list-style-type: none"> • Problem-Solving Skills: Ability to approach complex financial problems methodically.

2. Competencies

S/L	Competency	KSA Description
1	Technical Competencies	<p>Knowledge: Understand the concepts of statistics and Financial Theory.</p> <p>Skills: Quantitative Analysis: Ability to apply mathematical and statistical methods to analyze financial data.</p> <p>Attitudes: Ability to perform precise calculations and analyses to ensure accuracy in financial models.</p>
2	Analytical Competencies	<p>Knowledge: Econometrics: Understanding of econometric models and their application to financial data.</p> <p>Skills: Critical Thinking: Ability to evaluate and interpret data to make informed decisions. Attitudes: Logical Reasoning: Ability to apply logic and reasoning to analyze information and make sound decisions.</p>
3	Domain-Specific Competencies	<p>Knowledge: Risk Management: Understanding of risk assessment techniques and strategies to mitigate financial risks.</p> <p>Skills: Financial Analysis: Proficiency in analyzing financial statements, performance metrics, and economic indicators.</p> <p>Attitudes: Risk Assessment: Capacity to identify potential risks and implement measures to manage them effectively.</p>
4	Strategic Competencies	<p>Knowledge: Innovation: Knowledge of emerging technologies and innovative approaches in finance.</p> <p>Skills: Decision-Making: Skills in making informed and timely decisions based on thorough analysis.</p> <p>Attitudes: Adaptability: Capacity to adapt to new tools, technologies, and changing market conditions.</p>

3. Syllabus

COMPUTATIONAL FINANCE & MODELING SEMESTER – VII			
Course Code	M23BCB702	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:2:0)	SEE Marks	50
Total Number of Lecture Hours	38 + 12 = 50 hours	Total Marks	100
Credits	04	Exam Hours	03
Course Objectives:			
1. Record financial data analysis and modeling.			
2. Review quantitative finance skills, application of tools and techniques.			
3. Develop the knowledge for designing, developing and testing of computational finance models.			
Module -1			

Financial Products and Markets: Introduction to the financial markets and the products which are traded in them: Equities, indices, foreign exchange, and commodities. Options contracts and strategies for speculation and hedging-an introduction. **Statistical Analysis of Financial Returns:** Fat-tailed and skewed distributions, outliers, stylized facts.

Module -2

Mathematical Finance: Numerical methods relevant to integration, differentiation and solving the partial differential equations of mathematical finance: examples of exact solutions including Black Scholes and its relatives, finite difference methods including algorithms and question of stability and convergence, treatment of near and far boundary conditions, the connection with binomial models, interest rate models, early exercise, and the corresponding free boundary problems, and a brief introduction to numerical methods for solving multi-factor models.

Module -3

Financial derivatives: Black-Scholes framework: Black-Scholes PDE: simple European calls and puts; put-call parity. The PDE for pricing commodity and currency options. Discontinuous payoffs - Binary and Digital options. The Greeks: theta, delta, gamma, vega & rho and their role in hedging. The mathematics of early exercise – American options: perpetual calls and puts; optimal exercise strategy and the smooth pasting condition. Volatility considerations - actual, historical, and implied volatility.

Module -4

Data simulation and analysis: Simulation including random variable generation, variance reduction methods and statistical analysis of simulation output. Pseudo random numbers, Linear congruential generator, Mersenne twister RNG. The use of Monte Carlo simulation in solving applied problems on derivative pricing discussed in the current finance literature. The technical topics addressed include importance sampling, Monte Carlo integration, Simulation of Random walk and approximations to diffusion processes, martingale control variables stratification, and the estimation of the “Greeks”.

Module -5

Volatility Estimation: Volatility, implied volatility surface, and volatility estimation using high frequency data. Volatility estimation, models- ARCH-GARCH-other advanced models. CBOE VIX and India VIX indices. Volatility smile.

Text Books:

1. Paul Wilmott, Paul Wilmott on Quantitative Finance, 3 Volume Set, 2013, 2nd edition, Wiley.
2. Joerg Kienitz and Daniel Wetterau, Financial Modelling: Theory, Implementation and Practice with MATLAB, 2012, 1st edition, Wiley Finance Series.

Reference Books:

1. Dan Stefanica., A Primer for the Mathematics Of Financial Engineering, 2011, 2nd Edition FE Press, New York.
2. John C. Hull and Sankarshan Basu, Options, futures & other derivatives, 2018, 10th edition, Pearson India.

PRACTICAL COMPONENT OF IPCC

The following lab experiments could be planned on MATLAB-Computational Finance suite.

Sl. No	Experiment
1	Working with financial market data: data import, charting and basic analysis
2	Financial data: statistical analysis and simulation
3	Time series analysis
4	Volatility estimation
5	Option pricing models and analysis
6	Interest rate modelling and sensitivity analysis
7	Portfolio analysis and optimization
8	Risk estimation and hedging
9	Value at Risk (VaR) models
10	High frequency data analysis

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Introduction to Financial Products and Market	Introduction to concepts of financial product, Markets and market analysis.
2	Week 4-6: Mathematical Finance	Numerical methods relevant to integration, differentiation and solving the partial differential equations of mathematical finance.
3	Week 8-11:	Black-Scholes framework: Black-Scholes PDE: simple European calls



	Financial derivatives	and puts; put-call parity.
4	Week 7-8: Data simulation and analysis	Understand and apply Mathematical analysis and simulation.
5	Week 9-12: Volatility Estimation	Volatility Estimation analysis by using various Volatility Estimation models.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Collaborative Learning	Encourage collaborative learning for improved competency application.
3	Case Study based learning	Assign case study that solve real financial problems or simulate actual market scenarios.
4	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
5	Interactive Simulations and Modeling Tools	Simulation Exercises: Use trading simulations and risk assessment tools to provide hands-on experience.
6	Guest Lectures	Guest Lectures: Invite industry professionals to discuss real-world applications and current trends

6. Assessment Details (both CIE and SEE)

The Weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Theory Course with 4 credits: Integrated Professional Core Course (IPC)

Components		Number	Weightage	Max. Marks	Min. Marks
Theory (A)	Internal Assessment-Tests (A)	2	60%	15	06
	Assignments/Quiz/Activity (B)	2	40%	10	04
	Total Marks			100%	25
Components		Number	Weightage	Max. Marks	Min. Marks
Laboratory(B)	Record Writing	Continuous	60%	15	06
	Test at the end of the semester	1	40%	10	04
	Total Marks			100%	25

$$\text{Final CIE Marks} = (\text{A}) + (\text{B})$$

Semester End Examination pattern:

1. Question paper pattern will be ten questions. Each question is set for 20 marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. The question paper may include at least one question from the laboratory component.
5. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Foundational Knowledge	Understand the fundamental concepts of financial instruments, markets, and corporate finance.
2	Technical Proficiency	Implement numerical methods for solving equations, optimization, and simulations in financial contexts.
3	Analytical Skills	Analyze and interpret financial data using statistical and econometric methods.

4	Practical Application	Apply theoretical knowledge to solve real-world financial problems through project-based learning and case studies.
5	Problem-Solving	Critically evaluate financial models, identify potential issues, and propose improvements.

8. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M23BCB702.1	Apply the mathematical foundations of finance.
M23BCB702.2	Infer to analyse financial data.
M23BCB702.3	Analysis of financial markets and instruments.
M23BCB702.4	Design and test computational finance models.
M23BCB702.5	Survey the option pricing models and its applications for measuring and managing various types of financial risks.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB702.1	3	-	-	-	-	-	-	-	-	-	-	2	2	3
M23BCB702.2	-	3	-	-	-	-	-	-	-	-	-	-	2	-
M23BCB702.3	-	3	-	-	-	-	-	-	-	-	-	-	2	2
M23BCB702.4	-	-	3	-	-	-	-	-	-	-	-	-	3	-
M23BCB702.5	3	3	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB702	3	3	3	-	-	-	-	-	-	-	-	2	2.4	2.66

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject:

The field of Computational Finance and Modeling is evolving rapidly, driven by advancements in technology, data availability, and financial market dynamics.

- **AI Algorithms:** Increased use of machine learning algorithms for predictive modeling, risk management, and trading strategies engineering.
- **Data-Driven Decision Making:** Leveraging large datasets to gain insights into market trends, investor behavior, and economic indicators.
- **Real-Time Data Analysis:** Utilizing advanced analytics to process and analyze data in real-time for timely decision-making.
- **Quantum Algorithms:** Exploration of quantum algorithms for solving complex financial problems that is currently intractable with classical computers.

7th Semester	Professional Course (PC) HUMAN RESOURCE MANAGEMENT	M23BCB703
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Management Principles	Understanding of basic management concepts, organizational behavior, and business operations.
2	Psychology:	Basic understanding of human behavior, motivation, and personality theories.
3	Economics:	Basic knowledge of microeconomics and macroeconomics to understand the business environment.
4	Effective Communication:	Strong written and verbal communication skills to interact with employees, management, and external stakeholders.
5	Ethics:	Knowledge of ethical practices in HRM, including confidentiality, fairness, and equal opportunity.
6	Prioritization:	Ability to prioritize tasks and manage time effectively to handle multiple responsibilities.

2. Competencies

S/L	Competency	KSA Description
1	Technical Competencies	Knowledge: Human Resource Laws and Regulations. Skills: HR Analytics: Ability to use data analysis and metrics to inform HR decisions and strategies. Attitudes: Ability to manage detailed HR records and ensure accuracy in documentation and compliance.
2	Analytical Competencies	Knowledge: Organizational Behavior: Understanding of organizational dynamics, culture, and employee motivation. Skills: Ability to analyze complex situations and identify underlying issues, and develop strategic solutions. Attitudes: Ability to apply logical reasoning to evaluate HR practices and outcomes.
3	Active Listening	Knowledge: Understanding of effective communication principles and techniques. Skills: Ability to listen attentively and empathetically to understand employee concerns and feedback. Attitudes: Ability to build and maintain positive relationships with employees and management.
4	HR Practices	Knowledge: Knowledge of HR practices and trends in different countries and regions. Skills: Skills in managing HR functions in a global context and understanding international labor markets. Attitudes: Ability to adapt HR practices to different cultural and regulatory environments.
5	Ethical and Professional Competencies	Knowledge: Understanding of ethical principles and professional conduct in HRM. Skills: Ability to make decisions based on ethical considerations and professional standards. Attitudes: Capacity to uphold high ethical standards and demonstrate integrity in all HR activities.

3. Syllabus

HUMAN RESOURCE MANAGEMENT SEMESTER – VII			
Course Code	M23BCB703	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(4:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	50 hours Theory	Total Marks	100
Credits	04	Exam Hours	03
Course Objectives:			
1. Familiarize the basic concepts functional areas and activities of Human Resource Management			
2. Apply HRM concepts in organizational context			
3. Determine the HRM activities that leads to performance and sustainability of the organization.			
Module -1			
Human Resource Management: Concept and Challenges, HR Philosophy, Policies, Procedures and Practices.			

Module -2
Human Resource System Design: HR Profession, and HR Department, Line Management Responsibility in HRM, Measuring HR, Humanresources accounting and audit; Human resource information system. Functional Areas of HRM: Recruitment and staffing, benefits.
Module -3
Compensation, employee relations, HR compliance, organizational design, training and development, human resource information systems (H.R.I.S.) and payroll. Human Resource Planning: Demand Forecasting, Action Plans– Retention, Training, Redeployment & Staffing, Succession Planning.
Module -4
Strategic Management of Human Resources: SHRM, relationship between HR strategy and overall corporate strategy, HR as a Factor of Competitive Advantage. Managing Diverse and inclusive workforce: Demographic and Cultural Diversity, Global Context for Diversity Management.
Module -5
Social Psychological Perspectives of Workforce Diversity. Human Resource Management in Service Sector: Managing the Customer – Employee Interaction, Employee Empowerment and Customer Satisfaction, Service Failure and Customer Recovery – the Role of Communication and Training, Similarities and Differences in Nature of Work for the Frontline Workers and the Backend, Support Services
Text Books: <ol style="list-style-type: none"> 1. Dessler G, Varrkey B. Human Resource Management, 2020, 16th edition. Pearson Education India. 2. Joseph J. Martocchio, Human Resource Management, 2019, 15th edition, Pearson Education Champaign. Reference Books: <ol style="list-style-type: none"> 1. Mathis RL, Jackson JH. Human resource management, 2021, 15th edition, Jakarta: Salemba Empat.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Introduction to HRM	Introduction to concepts of Human Resource management and Challenges.
2	Week 4-6: Human Resource Management system Design	Understand the Management system Design.
3	Week 8-11: Human Resource Planning and Functional Areas of HRM	Understand the Functional areas of HRM and Effective planning of HRM.
4	Week 7-8: Strategic Management of Human Resources	Introduction to the relationship between HR strategy and overall corporate strategy, HR as a Factor of Competitive Advantage.
5	Week 9-12: Human Resource Management in Service Sector	Introduction to Managing the Customer – Employee Interaction, Employee Empowerment and Customer Satisfaction Role of communication.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Flipped Classroom	Assign readings and video lectures as homework, allowing classroom time to be used for discussions, case studies, and practical applications.
3	Real-World Projects	Assign projects that address real HR issues, such as developing recruitment strategies, designing training programs, or analyzing employee turnover.
4	Case Study Analysis	Use case studies to illustrate HR concepts and practices. Discuss the scenarios and explore multiple solutions..
5	Role-Playing	Engage students in role-playing exercises to simulate HR functions like interviewing, conflict resolution, and performance appraisals.
6	HR Simulations	Use simulations to provide hands-on experience in managing HR tasks like employee scheduling, benefits administration, and compliance management.

6. Assessment Details (both CIE and SEE)**Continuous Internal Evaluation:**

The minimum CIE marks requirement is 40% of maximum marks in each component.

CIE Split up

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

Final CIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understand Core HR Concepts:	Grasp the fundamental concepts of human resource management, including recruitment, selection, training, development, compensation, benefits, and employee relations..
2	Comprehend Organizational Behavior	Understand how individual and group behavior affects organizational effectiveness and the role of HR in shaping organizational culture..
3	Implement HR Strategies	Apply HR theories and practices to real-world scenarios through case studies, simulations, and projects.
4	Evaluate HR Practices:	Critically evaluate current HR practices and policies, identify areas for improvement, and recommend strategic changes.
5	Ethical Decision-Making	Demonstrate ethical behavior and decision-making in all HR activities, maintaining integrity and fairness.

8. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCB703.1	Recognize the basic concepts of HRM.
M23BCB703.2	Analyze the HR functions and activities in organizations.
M23BCB703.3	Articulate HRM activities with real time organizational environment.
M23BCB703.4	Comprehend the cross-cultural work dynamics and HR activities.
M23BCB703.5	Evaluate the impact of HR activities on different career outcomes

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB703.1	-	-	-	-	-	-	-	-	-	-	-	2	2	
M23BCB703.2	-	-	-	-	-	-	-	-	-	-	-	2	-	2
M23BCB703.3	-	-	-	-	-	-	-	-	-	-	-	2	2	
M23BCB703.4	-	-	-	-	-	-	-	-	-	-	-	2	2	2
M23BCB703.5	-	-	-	-	-	-	-	-	-	-	-	2		2
M23BCB703	-	-	-	-	-	-	-	-	-	-	-	2	2	2

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject:

- **AI and Automation:** HR processes such as recruitment, performance management, and employee engagement are increasingly driven by AI and automation. These technologies help in streamlining operations, enhancing decision-making, and providing personalized employee experiences.
- **Data-Driven HR:** HR analytics will play a critical role in strategic decision-making, using data to predict trends, manage talent, and improve employee satisfaction.
- **Personalized Learning Paths:** Tailored learning and development plans will become more prevalent, enabling employees to grow in their careers in alignment with organizational goals.

7th Semester	Professional Elective-III (PE) SERVICES SCIENCE & SERVICE OPERATIONS MANAGEMENT	M23BCB704A
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Principles of Management:	Familiarity with basic management principles, including planning, organizing, leading, and controlling.
2	Operations Management:	Understanding the fundamentals of operations management, such as process analysis, quality management, and supply chain management.
3	Statistics and Probability:	Knowledge of basic statistical concepts and probability is crucial for analyzing service operations data.
4	Service Marketing:	Knowledge of marketing principles specifically tailored for services, including the service marketing mix (7Ps)
5	Financial Analysis:	Ability to read and understand financial statements and assess the financial health of a service operation.
6	Cost Management:	Understanding cost control, budgeting, and financial planning in service organizations.

2. Competencies

S/L	Competency	KSA Description
1	Service Systems Design	Knowledge: Understanding the principles of designing service systems, including service blueprints, process flows, and customer interaction points. Skills: Ability to analyze service operations data to identify inefficiencies, bottlenecks, and opportunities for improvement. Attitudes: Ability to develop and implement long-term strategies for service operations that align with organizational goals.
2	Service Quality Management	Knowledge: Knowledge of tools and frameworks. Skills: Proficiency in using technology to streamline service operations. Attitudes: Capability to adapt to changing service environments, including new technologies, market demands, and customer expectations.
3	Service Innovation	Knowledge: Familiarity with the methods and processes used to innovate and enhance service offerings, such as design thinking and service design. Skills: Proficiency in managing service-related projects, from planning and execution to monitoring and evaluation. Attitudes: Capacity to innovate in service offerings and operations, ensuring the organization remains competitive and responsive to market needs.
4	Operations Management	Knowledge: Comprehensive understanding of the core principles of operations management as applied to service environments, including process design, capacity planning, and inventory management. Skills: Expertise in applying continuous improvement methodologies like Lean and Six Sigma to enhance service operations. Attitudes: Commitment to achieving and maintaining high standards of operational efficiency and effectiveness in service management.

3. Syllabus

SERVICES SCIENCE & SERVICE OPERATIONS MANAGEMENT SEMESTER – VII			
Course Code	M23BCB704A	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 hours Theory	Total Marks	100
Credits	03	Exam Hours	03
Course Objectives:			
<ol style="list-style-type: none"> Equip students with the knowledge and tools to design, analyze, and improve service systems. Understand and apply quality management frameworks. Develop students' analytical and problem-solving skills to address operational challenges in service settings, using real-world case studies and data-driven approaches. Prepare students to lead and collaborate in diverse teams, driving service excellence through effective 			

communication, leadership, and teamwork in service operations.
Module -1
UNDERSTANDING SERVICES: Introduction to service operations, Introduction to Indian service sector. The Role of Services in an Economy, The Nature of Services, Service Strategy.
Module -2
DESIGNING THE SERVICE ENTERPRISE: New Service Development, Technology in Services, Service Quality, Supporting Facility and Process Flows.
Module -3
Process Improvement, The Service Encounter, Service Facility Location, Service Guarantee & service Recovery.
Module -4
MANAGING SERVICE OPERATIONS: Managing Capacity and Demand, Managing Waiting Lines, Service Supply Relationships, Managing Service Projects.
Module -5
QUANTITATIVE MODELS FOR SERVICE MANAGEMENT: Capacity Planning and Queuing Models, Forecasting Demand for Services, Managing Service Inventory
Text Books:
1. Fitzsimmons & Fitzsimmons, Service Management: Operations, Strategy, Information Technology, 7th edition, McGraw Hill publications.
2. Johnston, R. and Clark, G. (2008). Service Operations Management: Improving Service Delivery, 3rd Edition, Financial Times/Prentice Hall
Reference Books:
1. Wright, N.J., and Race, P. (2004). The Management of Service Operations, 2nd Edition, Thomson Press

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Introduction, Overview of Service and Service operations	Introduction to concepts of service. The Role of Services in an Economy
2	Week 4-6: Designing The Service Enterprise	Introduction to development of service enterprise, service quality.
3	Week 8-11: Process Improvement	Introduction to concepts of process improvement, service facility location.
4	Week 7-8: Knowledge & reasoning	Introduction to the concepts of knowledge representation. Approaches to knowledge representation and issues in knowledge representation.
5	Week 9-12: Probabilistic reasoning	Introduction to theories of Probabilistic reasoning. Introduction to expert systems and its applications.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Case Studies and Real-World Examples	To bridge theory and practice by analyzing real-world service management challenges.
3	Experiential Learning and Simulations	To give students hands-on experience in managing service operations.
4	Project-Based Learning	To develop practical skills and apply knowledge in real or simulated projects.
5	Problem-Based Learning	To develop critical thinking and problem-solving skills by tackling complex, open-ended problems.
6	Flipped Classroom Approach	To maximize in-class engagement and hands-on activities.

6. Assessment Details (both CIE and SEE)**Continuous Internal Evaluation:**

The minimum CIE marks requirement is 40% of maximum marks in each component.

CIE Split up

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

Final CIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understand the Fundamentals of Service Systems	Students will be able to describe and explain the key components of service systems, including service design, customer interaction points, and service delivery processes.
2	Analyze Service Operations	Students will be able to apply quality management frameworks.
3	Apply Technology and Innovation in Service Operations	Students will demonstrate the ability to integrate emerging technologies and innovative practices.
4	Design and Optimize Service Processes	Students will be able to design service processes that optimize resource utilization, minimize costs, and enhance customer experiences.
5	Communicate Service Management Concepts Effectively	Students will develop the ability to clearly communicate service management concepts, strategies, and solutions to diverse audiences, both in written and oral formats.

8. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCB704A.1	Examine the perspectives on the nature and role of services and comprehend the issues in service strategy.
M23BCB704A.2	Apply the principles, tools and techniques of service design.
M23BCB704A.3	Apply tools for demand forecasting, capacity management and other management issues in service operations.
M23BCB704A.4	Assess the service quality management issues in a service enterprise.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB704A.1	-	-	-	-	-	-	-	-	-	-	-	2	3	3
M23BCB704A.2	3	-	-	-	3	-	-	-	-	-	-	-	-	3
M23BCB704A.3	3	-	-	-	3	-	-	-	-	-	-	-	3	3
M23BCB704A.4	3	-	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB704A	3	-	-	-	3	-	-	-	-	-	-	2	3	3

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5	3	2	2	3		10
Total	13	12	12	13		50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5	5	5	5	5		20
Total	25	25	25	25		100

10. Future with this Subject:

- **Increased Integration of Artificial Intelligence (AI) and Automation:** AI and automation will play a central role in streamlining service operations, from customer service chatbots to predictive maintenance in service delivery.
- **Data-Driven Decision Making:** The use of big data and analytics will become even more critical in understanding customer behavior, optimizing operations, and personalizing services.

7 th Semester	Professional Course -III (PC) ETHICAL HACKING AND NETWORK DEFENSE	M23BCS704B
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1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Operating Systems	Familiarity with Windows, Linux, and macOS.
2.	Networking	Understanding of TCP/IP, subnetting, network masks, and common networking protocols.
3.	Cyber security Fundamentals	Basic understanding of information security principles and practices. Knowledge of common threats, vulnerabilities, and attack vectors.
4.	Programming Skills	Ability to write scripts to automate tasks and exploit vulnerabilities.

2. Competencies

S/L	Competency	KSA Description
1.	Basics of Ethical Hacking Techniques	<p>Knowledge:</p> <ul style="list-style-type: none"> Familiarity with reconnaissance, exploitation, and post-exploitation techniques. Awareness of cybersecurity laws, regulations, and ethical hacking guidelines. <p>Skills:</p> <ul style="list-style-type: none"> Proficiency in using tools like Nmap, Wireshark, Metasploit, and Burp Suite for ethical hacking. Ability to ensure compliance with legal standards and ethical practices. <p>Attitudes:</p> <p>Integrity and a strong sense of ethical responsibility and adherence to legal guidelines.</p>
2.	Embedded Systems, Networking Fundamentals & Cryptography	<p>Knowledge:</p> <ul style="list-style-type: none"> Familiarity with Windows, Linux, and macOS operating systems. Understanding of TCP/IP, DNS, DHCP, subnetting, and common networking protocols. Understanding of cryptographic principles such as public-key cryptography, cryptographic hashing, and digital signatures. <p>Skills:</p> <ul style="list-style-type: none"> Proficiency in using command-line interfaces, managing system processes, and configuring system settings. Ability to configure and troubleshoot network devices, analyze network traffic, and understand network topologies. Implement cryptographic algorithms like Secret Key Cryptography (SKC), Public Key Cryptography (PKC) & Hash Functions. <p>Attitudes:</p> <ul style="list-style-type: none"> Willingness to explore and experiment with different operating systems. Curiosity and a proactive approach to learning about network infrastructures.
3.	Defensive Strategies	<p>Knowledge: Understanding of firewalls, intrusion detection/prevention systems (IDS/IPS), and endpoint security solutions.</p> <p>Skills: Ability to configure and manage security devices, monitor network traffic, and respond to security incidents.</p> <p>Attitudes: Proactive and defensive mindset towards protecting systems and networks.</p>

3. Syllabus

ETHICAL HACKING AND NETWORK DEFENSE			
VII SEMESTER			
Course Code	M23BCS704B	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 Hours	Total Marks	100
Credits	03	Exam Hours	03
<p>Course objectives: This course will enable students to:</p> <ul style="list-style-type: none"> To understand the core concepts of Ethical Hacking To understand how security vulnerabilities are exploited To analyze the impact of security vulnerabilities in systems To understand popular Network Defense solutions deployed at large organizations To configure basic firewall and IDS solution 			

Module – 1
Introduction: Ethical Hacking Overview - Role of Security and Penetration Testers, Penetration-Testing Methodologies, Laws of the Land, Overview of TCP/IP, The Application Layer, The Transport Layer, The Internet Layer, IP Addressing – Textbook 1: Chapter 1 & 2
Module - 2
Network and Computer Attacks –Malware, Protecting Against Malware Attacks, Intruder Attacks , Addressing Physical Security - Textbook 1: Chapter 3 Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Textbook 2: Chapter
Module - 3
Desktop and Server OS Vulnerabilities: Windows OS Vulnerabilities, Tools for Identifying Vulnerabilities in Windows, Best Practices for Hardening Windows Systems, Linux OS Vulnerabilities Textbook 1: Chapter 8
Module-4
Embedded Operating Systems: Introduction to Embedded Operating Systems, Windows and Other Embedded Operating Systems, Vulnerabilities of Embedded OS. Textbook 1: Chapter 9
Module - 5
Network Protection Systems: Understanding Network Protection Systems, Understanding Firewalls, Understanding Intrusion Detection and Prevention Systems, Understanding Honeypots. Textbook 1: Chapter 13
Text Books:
<ol style="list-style-type: none"> 1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010. 2. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010
Reference Books:
<ol style="list-style-type: none"> 1. Stuart McClure, Joel Scambray and Goerge Kurtz, “Hacking Exposed Network Security Secrets & Solutions”, 5th Edition, Tata Mc Graw Hill Publishers, 2010. 2. Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz , 2014.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: Fundamentals of Ethical hacking & Operating systems	Familiarity with reconnaissance, exploitation, and post-exploitation techniques. Awareness of cybersecurity laws, regulations, and ethical hacking guidelines. Familiarity with Windows, Linux, and macOS operating systems.
2	Week 3-4: Networking Primer	Understanding of TCP/IP, DNS, DHCP, subnetting, and common networking protocols. Understanding of cryptographic principles such as public-key cryptography, cryptographic hashing, and digital signatures.
3	Week 5-6: Techniques for Network Intrusion Detection System	Understanding of firewalls, intrusion detection/prevention systems (IDS/IPS), and endpoint security solutions.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies

6	Multiple Representations	Introduce topics in various representations to reinforce competencies
7	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
8	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

6. Assessment Details (both CIE and SEE)

The Weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

$$\text{Final CIE Marks} = (A) + (B)$$

Average internal assessment shall be the average of the 2 test marks conducted.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Ethical Hacking Fundamentals	Students will grasp the fundamental concepts of ethical hacking, including Life Cycle of Ethical Hacking, Types of Ethical Hacking, Fundamentals of Vulnerability Analysis and Penetration Testing.
2	Understanding Network Attack and Defense	Students will grasp the fundamental concepts of Network Attack and Defense techniques and can perform Vulnerability and Penetration testing on given Vulnerable system and generate report.
4	Collaboration and Communication Skills	Students will work collaboratively in teams on design projects, enhancing their ability to communicate effectively, share ideas, and solve problems collectively.
5	Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated with digital design, including respecting intellectual property rights, ensuring design reliability and security, and adhering to industry standards and best practices.

8. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCS704B.1	To understand how to find security vulnerabilities in given system.
M23BCS704B.2	To suggest the remediation steps for identified security bugs.
M23BCS704B.3	To perform VAPT task on given system and submit professional report.
M23BCS704B.4	To demonstrate knowledge of Embedded OS and vulnerabilities.
M23BCS704B.5	To demonstrate knowledge of IDS Systems and IDS signatures.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCS704B.1	3	-	-	-	-	-	-	-	-	-	-	-		
M23BCS704B.2	-	3	-	-	-	-	-	-	-	-	-	-		
M23BCS704B.3	-	-	3	-	-	-	-	-	-	-	-	-		
M23BCS704B.4	3	-	-	-	-	-	-	-	-	-	-	-		
M23BCS704B.5	3	-	-	-	-	-	-	-	-	-	-	-		
M23BCS704B	3	3	3	-	-	-	-	-	-	-	-	-		

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The "Ethical Hacking and Network Defense" course in the - semester of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of cyber security. Here are some notable contributions:

- **Innovation and Research:** Working with the latest technologies and tools in cybersecurity. Engaging in research to develop new methods and tools for defending against cyber threats.
- **Continuous Learning:** Cybersecurity is a rapidly evolving field, requiring continuous learning and adaptation to new threats and technologies. Playing a crucial role in protecting sensitive data and maintaining the integrity of information systems.
- **Global Opportunities:** With the increasing number of cyber threats, there is a high demand for skilled cybersecurity professionals. Opportunities are available in various sectors including finance, healthcare, government, and technology.
- **Career Opportunities:**
 - Penetration Tester: Conducting authorized simulated attacks on computer systems to identify vulnerabilities.
 - Security Analyst: Monitoring and analyzing security systems to detect and respond to security incidents.
 - Security Consultant: Advising organizations on best practices for securing their networks and systems.
 - Incident Responder: Responding to and mitigating the impact of security breaches and incidents.

7 th Semester	Professional Elective -III (PE) DIGITAL IMAGE PROCESSING	M23BCS704C
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1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Basic Computer Science Concepts	Algorithms and Data Structures: Understanding fundamental algorithms and data structures, as they are important for implementing efficient image processing algorithms. Complexity Analysis: Knowledge of time and space complexity to evaluate the efficiency of image processing algorithms.
2.	Image Basics	Digital Image Fundamentals: Understanding the nature of digital images, including pixels, color models (RGB, HSV, etc.), and image formats. Image Representation: Concepts of image resolution, bit depth, and color spaces.
3.	Basic Computer Science Concepts	Algorithms and Data Structures: Understanding fundamental algorithms and data structures, as they are important for implementing efficient image processing algorithms. Complexity Analysis: Knowledge of time and space complexity to evaluate the efficiency of image processing algorithms.
4.	Mathematics	Linear Algebra: Concepts like matrices, vectors, eigenvalues, and eigenvectors are crucial for understanding image transformations and filtering. Calculus: Differential calculus for gradient-based methods and integral calculus for operations like convolution. Probability and Statistics: Essential for understanding noise modeling, image analysis, and algorithms based on statistical methods.
5.	Signal Processing	Discrete Signals: Understanding how to work with discrete signals, which is analogous to working with digital images. Fourier Transform: Knowledge of the Fourier Transform and its discrete counterpart (DFT) for frequency domain analysis of images. Filtering: Basic concepts of filtering in the spatial and frequency domains, including convolution and correlation.
6.	Programming Skills	Programming Languages: Proficiency in languages like Python, MATLAB, or C/C++ which are commonly used for implementing image processing algorithms. Libraries and Tools: Familiarity with image processing libraries and tools such as OpenCV (for C++ and Python), scikit-image (Python), or MATLAB's Image Processing Toolbox.

2. Competencies

S/L	Competency	KSA Description
1.	Understanding of Digital Image Fundamentals	Knowledge: Knowledge of how images are represented digitally, including pixel values, color models (RGB, grayscale, etc.), and image formats Skills: Ability to evaluate image quality using metrics such as PSNR (Peak Signal-to-Noise Ratio), MSE (Mean Squared Error), and structural similarity index. Attitudes: User interaction
2.	Mathematical Foundations	Knowledge: Proficiency in matrix operations, eigenvalues, and eigenvectors, as they apply to image transformations and filtering. Skills: Understanding of differentiation and integration for gradient-based methods and convolution operations. Attitudes: Ability to apply statistical methods for noise modeling, image analysis, and algorithm evaluation
3.	Image Processing Fundamentals	Knowledge: Understanding how images are stored and represented digitally (e.g., pixels, color models like RGB and CMYK). Skills: Applying various filters (e.g., blurring, sharpening) and understanding convolution operations. Attitudes: Implementing geometric transformations such as scaling, rotation, and translation.
4.	Image Segmentation	Knowledge: Techniques for segmenting images based on intensity levels. Skills: Applying methods like k-means or mean-shift for segmenting images into distinct regions.

		Attitudes: Approaches like region growing or watershed for more complex segmentation tasks.
5.	Computer Vision	Knowledge: Proficiency with image processing libraries such as OpenCV, PIL/Pillow, scikit-image, or TensorFlow/Keras for deep learning Skills: Familiarity with programming languages commonly used in image processing, like Python, C++, or MATLAB. Attitudes: Using image processing for visual perception in robotics applications.

3. Syllabus

DIGITAL IMAGE PROCESSING SEMESTER – VII			
Course Code	M23BCS704C	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 hours Theory	Total Marks	100
Credits	03	Exam Hours	03
Course objectives:			
<ul style="list-style-type: none"> ● Understand the fundamentals of digital image processing. ● Understand the image transforms used in digital image processing. ● Understand the image enhancement techniques used in digital image processing. ● Understand the image restoration techniques and methods used in digital image processing. ● Understand the Morphological Operations used in digital image processing. 			
Module-1			
Digital Image Fundamentals: What is Digital Image Processing?, Origins of Digital Image Processing, Examples of fields that use DIP, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Elements of Visual Perception, Image Sensing and Acquisition. (Text: Chapter 1 and Chapter 2: Sections 2.1 to 2.2, 2.6.2) L1, L2			
Module-2			
Image Enhancement in the Spatial Domain: Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations. Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters (Text Chapter 2: Sections 2.3 to 2.62, Chapter3: Sections 3.2 to 3.6), L1,L2			
Module-3			
Frequency Domain: Preliminary Concepts, The Discrete Fourier Transform (DFT) of Two Variables, Properties of the 2-DDFT, Filtering in the Frequency Domain, Image Smoothing and Image Sharpening Using Frequency Domain Filters, Selective Filtering. (Text: Chapter4: Sections 4.2, 4.5 to 4.10), L1,L2			
Module-4			
Restoration: Noise models, Restoration in the Presence of Noise Only using Spatial Filtering and Frequency Domain Filtering, Linear, Position-Invariant degradations Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering. (Text: Chapter 5: Sections 5.2, to 5.9) L1,L2			
Module-5			
Morphological Image Processing: Preliminaries, Erosion and Dilation, Opening and Closing. Image Processing: Color Fundamentals, Color Models, Pseudo color Image Processing. (Text: Chapter 6: Sections 6.1 to 6.3 Chapter 9: Sections 9.1 to 9.3) L1,L2			
Text Book(s)			
<ol style="list-style-type: none"> 1. Digital Image Processing- Rafael C Gonzalez and Richard E. Woods, PHI3rd Edition 2010 2. Digital Image Processing- S. Jayaraman, S.Esakkirajan, T. Veerakumar, Tata Mc Graw Hill 2014. 			
References Books:			
<ol style="list-style-type: none"> 1. Fundamentals of Digital Image Processing- A. K. Jain, Pearson 2004. 2. Image Processing analysis and Machine Vision with Mind Tap by Milan Sonka and Roger Boile, Cengage Publications, 2018. 			

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Module 1	<ul style="list-style-type: none"> ● Whatis Digital Image Processing? ● Origins of Digital Image Processing,

		<ul style="list-style-type: none"> • Examples of fields that use DIP, • Fundamental Steps in Digital Image Processing, • Components of an Image Processing System, • Elements of Visual Perception, Image Sensing and Acquisition
2	Week 3-7: Module 2	<ul style="list-style-type: none"> • Image Sampling and Quantization, • Some Basic Relationships between Pixels, Linear and Nonlinear Operations. • Some Basic Intensity Transformation Functions, • Histogram Processing, Fundamentals of Spatial Filtering, • Smoothing Spatial Filters, Sharpening Spatial Filters
3	Week 7-11: Module 3	<ul style="list-style-type: none"> • Preliminary Concepts, • The Discrete Fourier Transform (DFT) of Two Variables, • Properties of the 2-DDFT, Filtering in the Frequency Domain, • Image Smoothing and Image Sharpening Using Frequency Domain Filters, Selective Filtering.
4	Week 10-12: Module 4	<ul style="list-style-type: none"> • Noise models, • Restoration in the Presence of Noise Only using Spatial Filtering and Frequency Domain Filtering, • Linear, Position-Invariant degradations Estimating the Degradation Function, • Inverse Filtering, Minimum Mean Square Error(Wiener) Filtering, • Constrained Least Squares Filtering.
5	Week 12-15: Module 5	<ul style="list-style-type: none"> • Preliminaries, • Erosion and Dilation, • Opening and Closing. • Image Processing: Color Fundamentals, • Color Models, • Pseudo color Image Processing.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Project-Based Learning	Design courses around real-world projects that students can work on individually or in teams.
2	Design Sprints	Incorporate design sprints to teach students the iterative process of prototyping, testing, and refining designs.
3	Empathy Exercises	Implement activities that help students develop empathy for users, such as user persona creation and journey mapping.
4	Higher Order Thinking (HOTS)	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Team Projects	Promote collaboration through group projects that mimic real-world team dynamics.
6	Peer Reviews	Encourage peer reviews and critiques to develop critical thinking and feedback skills.
7	Guest Speakers	Invite industry professionals to share their experiences and insights.

6. Assessment Details (both CIE and SEE)

The Weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

Final CIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Fundamental Concepts and Theory	Describe how digital images are represented, including concepts like pixels, color models (RGB, CMYK), and image resolution. Students will be able to explain how digital images are stored and processed, including the impact of different color models and image resolutions on image quality.
2	Image Enhancement and Restoration	Implement techniques to improve the quality of an image, including histogram equalization, contrast stretching, and filtering. Students will be able to apply various enhancement techniques to improve the visual appearance of images.
3	Image Transformations	Explain and apply image transformations in both spatial and frequency domains, including Fourier transform and discrete cosine transform. Students will understand and use transformations to analyze and process images in different domains for various applications.
4	Advanced Image Processing Techniques	Use machine learning and artificial intelligence techniques for advanced image processing tasks, such as object recognition and classification. Students will be able to integrate AI and machine learning methods to enhance image processing capabilities and automate complex tasks.
5	Ethical and Social Implications	Discuss the ethical considerations related to image processing, including privacy concerns and the responsible use of image manipulation technologies. Students will be aware of the ethical implications and social impact of image processing technologies.

8. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M23BCS704C.1	Understand & Apply basic concepts of digital image processing & its applications
M23BCS704C.2	Illustrate the use of image enhancement technique using Spatial and frequency domain for various image transformations.
M23BCS704C.3	Infer image compression standards, segmentation and representation techniques.
M23BCS704C.4	Analyze basic image processing algorithms for specific applications.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
M23BCS704C.1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
M23BCS704C.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
M23BCS704C.3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
M23BCS704C.4	-	3	-	-	-	-	-	-	-	-	-	-	3	3
M23BCS704C	3	3	-	-	-	-	-	-	-	-	-	-	3	3

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5	3	2	2	3		10
Total	13	12	12	13		50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5	5	5	5	5		20
Total	25	25	25	25		100

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject**1. Advancements in Artificial Intelligence and Machine Learning**

- **AI-Enhanced Processing:** Machine learning and deep learning algorithms will continue to revolutionize image processing, enabling more sophisticated tasks such as object detection, facial recognition, and image classification. AI-driven techniques will improve accuracy and efficiency in processing and analyzing images.

7 th Semester	Professional Elective-III (PE) USER INTERFACE DESIGN	M23BCS704D
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic Computer Skills	Basic computer skills, such as saving files in multiple versions and formats.
2	Programming basic tools	Familiar with Programming tools like assemblers, compilers, linkers translate, flowchart, algorithms which can be used to form a program from a human write-able and readable source language into the bits and bytes that can be executed by a computer.
3	Programming Fundamentals	Familiar with general coding concepts like variables, basic data types, Conditional Statements, Looping, Functions, creation of source file, compilation process, program execution techniques.
4	Basic Object Orientation Concepts	Basic of four basic principles: encapsulation, inheritance, polymorphism, and abstraction. Where these four OOP principles can be used enable to create objects and collaborate to create powerful applications too.

2. Competencies

S/L	Competency	KSA Description
1.	Understanding basic User Interface Design	<p>Knowledge: Importance of User Interface Design for any application. Understanding of the basics of User Interface Design.</p> <p>Skills: Ability to know the basic principles of Interface Design for the Users.</p> <p>Attitudes: Appreciation to understand the importance of Interface Design and implement the same with respect to user's perspective.</p>
2.	Design Process: Requirement Analysis	<p>Knowledge: Understanding of the need of requirement analysis before any design is to be made. Principles of Requirement Analysis and techniques.</p> <p>Skills: Steps to understand with proper guidelines to collect the requirements for the design.</p> <p>Attitudes: Appreciation for the procedure to gather the appropriate requirements for the design.</p>
3.	Design Process: Business Function & Screen Design	<p>Knowledge: Understanding the basic business functions with respect to user interface design. Importance of Screen Design.</p> <p>Skills: Defining appropriate Business Protocols and strategies. Designing of Screen Elements to produce Good Screen Design.</p> <p>Attitudes: Valuing the importance of Business Strategies and Screen Design which is appropriate for different types of Users.</p>
4.	Design Process: Menus	<p>Knowledge: Understanding the importance of Menus and its items for user interaction.</p> <p>Skills: Applying Guidelines of Menu Design and its Items to create proper structure of menu usage.</p> <p>Attitudes: Creativeness to design the menu and its items for effective usage.</p>
5.	Design Process: Window	<p>Knowledge: Understanding of issues and structures of windows and its types</p> <p>Skills: Constructing window structure to suit the best design for the elements of the screen for user interaction.</p>

		Attitudes: Appreciation for the way types of windows can be designed and used with good design.
6.	Design Process: Controls	Knowledge: Understanding the characteristics and importance of Screen Controls. Skills: Designing and analyzing the appropriate Screen Controls. Attitudes: Recognizing the significance of screen controls.
7.	Design Process: Tests	Knowledge: Understanding the importance of Testing. Skills: Designing and analyzing elements of the screen through testing. Attitudes: Valuing the importance of Testing and Re-Testing

3. Syllabus

USER INTERFACE DESIGN SEMESTER – VII			
Course Code	M23BCS704D	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 Hours	Total Marks	100
Credits	03	Exam Hours	03
Course Objectives:			
1.To study the concept of menus, windows, interfaces			
2. To study about business functions			
3. To study the characteristics and components of windows and the various controls for the windows.			
4. To study about various problems in windows design with color, text, graphics and study the testing methods			
Module -1			
Overview Introduction to User Interface, Defining the User Interface, The Importance of Good Design, A Brief History of the Human-Computer Interface, The Concept of Direct Manipulation, Graphical Systems: Advantages and Disadvantages, Characteristics of the Graphical User Interface, Characteristics of a Web Interface, General Principles of User Interface Design.			
Textbook 1: Selected Topics from Part-1			
Module -2			
Introduction to The User Interface Design Process, Obstacles and Pitfalls in the Development Path, Designing for People: The Five Commandments, Usability, Important Human Characteristics in Design, Human Considerations in Design, Human Interaction speeds.			
Textbook 1: Selected Topics from Part-2 Step-1			
Module -3			
Introduction to Understand the Business Function, Business Definition and Requirements Analysis, Determining Basic Business Functions, Basic business functions, Design standards. Understand the Principles of Good Screen Design, Human Considerations in Screen Design.			
Textbook 1: Selected Topics from Part-2 and Step-3			
Module -4			
Introduction to Develop System Menus and Navigation Schemes, Structures of Menus, Functions of Menus, Contents of Menus, Formatting of Menus, Phrasing the Menu, Selecting Menu Choices, Navigating Menus, Kinds of Graphical Menus.			
Textbook 1: Selected Topics from Part-2 Step-4			
Module -5			
Introduction to Select the Proper Kinds of Windows, Window Characteristics, Components of window, Window presentation styles, Types of Windows, Characteristics of Device Based Controls. Introduction to Choose the Proper Screen Based Controls, Operable Controls, Windows Tests-prototypes, kinds of tests.			
Textbook 1: Selected Topics from Part-2 Step-5, Step-6, Step-7 & Step-14			
TEXTBOOKS:			
1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", John Wiley & Sons, Second Edition 2002			
2. Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.			
REFERENCE BOOKS:			
1. Alan Cooper, "The Essential of User Interface Design", Wiley- Dream Tech Ltd., 2002.			

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Introduction to User Interface	Understanding the importance of User Interface design and Defining the User Interface, get to know the history of the Human-Computer Interface with Direct Manipulation and indirect manipulation along with the Characteristics of a Web Interface.
2	Week 4-6: Requirement Analysis for Design Process	Understanding the initial step of User Interface Design Process by knowing the Obstacles and Pitfalls in the Development Path and how People should be involved in the Designing process.
3	Week 7-8: Business Functions in Design Process	Understand the Business Function and Business Definition with Design standards with the importance of Good Screen Design by considering Human interaction in the process.
4	Week 9-10: Menus in Design Process	To Understand about Menus with its Structures, Functions, Contents, Formatting, Phrasing, Selection of Menu Items and Navigation of Menus with its Kinds.
5	Week 11-12: Windows, Controls and Test in Design Process	Selection of Proper Kinds of Windows by knowing the Window Characteristics with its Components and the styles to present it, Device Controls which can be used with Proper Screen Based Controls and Finally how Windows Tests-prototypes can be conducted knowing the kinds of tests.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Image/Video/Animation	Incorporate visual aids like image/videos/animations to enhance understanding of programming constructs.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Group-Based Learning (GBL)	Implement GBL to enhance analytical skills and Design Skills
6	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
8	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies

6. Assessment Details (both CIE and SEE)**Continuous Internal Evaluation:**

This section of regulations is applicable to all theory-based courses. The minimum CIE marks requirement is 40% of maximum marks in each component.

CIE Split up

	Components	Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

Final CIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20 marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.

4. Marks scored will be proportionally scaled down to 50 marks.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding and applying the basic User Interface Design	Students will grasp the fundamental concepts of User Interface Design by applying the basic elements of the design.
2	Applying the System Requirements during Design Process	Students will apply strategies for requirement analysis as part of the design process.
3	Analyse the Business Function & Screen Layouts	Students will become analyse the Business functions with respect to User Interface Design and uses the appropriate Screen Design.
4	Implement the appropriate Menus	Students will implement various types of Menus and its usage while designing the screen elements.
5	Examine the Design Process with Window, Controls and Tests	Students will examine Window and its element design with proper device controllables. Later the design test and retest process applications.

8. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

Cos	Description
M23BCS704D.1	Understand and apply the fundamental characteristics of computer interface, graphics interface and web interface
M23BCS704D.2	Apply the various components of user interface design during the design process
M23BCS704D.3	Analyse the various characteristics of user interface components during the design process.
M23BCS704D.4	Implement the appropriate design strategies for good interface design.
M23BCS704D.5	Design the prototypes of user interface and examine with testing process.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCS704D.1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
M23BCS704D.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
M23BCS704D.3	-	3	-	-	-	-	-	-	-	-	-	-	3	-
M23BCS704D.4	-	-	3	-	-	-	-	-	-	-	-	-	3	3
M23BCS704D.5	-	-	-	3	-	-	-	-	-	-	-	-	3	3
M23BCS704D	3	3	3	3	-	-	-	-	-	-	-	-	3	3

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject:

- ❖ **Advanced UserInterface Design Courses:** The knowledge gained in this course, covering principles of Design and Human Interaction Can is used to have more advanced complete design courses.
- ❖ **User-Centric Design:** Companies are prioritizing user-centric design to differentiate themselves in a competitive market, leading to increased demand for UI/UX professionals.
- ❖ **Mobile and Web Applications:** The proliferation of mobile devices and web applications has created a need for well-designed interfaces that provide seamless experiences across various platforms.
- ❖ **Emerging Technologies:** As emerging technologies like AI, AR/VR, and voice interfaces become more prevalent, UI/UX designers will be needed to create intuitive and engaging experiences.
- ❖ **Accessibility and Inclusive Design:** There is a growing focus on designing products that are accessible to all users, including those with disabilities, opening up opportunities for UI/UX professionals with expertise in inclusive design.
- ❖ **Continuous Iteration and Improvement:** The iterative nature of UI/UX design means that there will always be a need for designers to collect user feedback, analyze data, and make improvements to existing products.
- ❖ **Project Work and Research:** The hands-on experience gained through design process and its fundamentals can be utilized to design front-end of project work.
- ❖ **Industry Applications:** The course provides some fundamentals and guidelines which can be used in real-time project works.

7 th semester	Professional Elective-IV (PE) Quantum Computing	M23BCS705A
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Linear Algebra	Essential for understanding quantum states, gates, and transformations. Proficiency in vector spaces, matrices, eigenvalues, eigenvectors, and tensor products.
2	Probability Theory	Necessary for understanding quantum measurements and probability amplitudes. Proficiency in basic probability concepts is required.
3	Complex Numbers	Fundamental for quantum state representation. Proficiency in complex arithmetic and complex plane visualization.
4	Algorithms	Required for understanding classical algorithms before quantum ones. Proficiency in designing and analyzing classical algorithms.
5	Programming	Essential for implementing quantum algorithms. Proficiency in Python and familiarity with quantum programming frameworks like Qiskit.

2. Competencies

S/L	Competency	KSA Description
1	Quantum Computing Concepts	<p>Knowledge: Understand and articulate the fundamental principles of quantum mechanics, such as superposition, entanglement, and quantum interference, and how they apply to quantum computing.</p> <p>Skills: Demonstrate proficiency in designing, simulating, and optimizing quantum algorithms using quantum programming languages.</p> <p>Attitudes: Adopt a mindset for applying quantum computing techniques to real-world challenges in areas like cryptography and artificial intelligence.</p>
2	Problem-solving Skills	<p>Knowledge: Understand the potential of quantum computing to solve complex problems faster than classical computers, including problems related to cryptography, optimization, and data analysis.</p> <p>Skills: Demonstrate the ability to design and implement quantum algorithms that address specific problems, utilizing quantum principles like superposition and entanglement to optimize solutions.</p> <p>Attitudes: Adopt a creative and critical approach to problem-solving, exploring innovative quantum computing solutions to real-world challenges in fields such as machine learning, logistic</p>
3	Critical Thinking	<p>Knowledge: Understand the theoretical foundations of quantum computing and its limitations, including the challenges of noise, decoherence, and error correction in quantum systems.</p> <p>Skills: Demonstrate the ability to critically analyze and evaluate quantum algorithms and quantum hardware, identifying potential issues and improvements for more efficient solutions.</p> <p>Attitudes: Cultivate a mindset of curiosity and skepticism, continuously questioning assumptions and exploring innovative approaches to overcome challenges in the development of quantum te</p>
4	Mathematical Foundations	<p>Knowledge: Understand the mathematical principles underlying quantum computing, including linear algebra, complex numbers, probability theory, and quantum state representation.</p> <p>Skills: Demonstrate the ability to apply mathematical tools to model quantum systems, analyze quantum algorithms, and solve problems related to qubits,</p>

		quantum gates, and entanglement. Attitudes: Adopt a detail-oriented approach to problem-solving, valuing precision and accuracy in mathematical modeling to ensure the correct application of quantum computing concepts.
5	Classical Computing Fundamentals	Knowledge: Understand the core principles of classical computing, including algorithms, data structures, and computational complexity, and how they contrast with quantum computing concepts. Skills: Demonstrate the ability to apply classical computing knowledge to identify the limits of classical systems and determine when quantum computing provides a potential advantage. Attitudes: Adopt an interdisciplinary mindset, recognizing the complementary roles of classical and quantum computing in solving complex problems and driving technological advancements.

3. Syllabus

Quantum Computing SEMESTER – VII			
Course Code	M23BCS705A	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 Hours	Total Marks	100
Credits	03	Exam Hours	03
Course objectives: This course will enable students to: <ol style="list-style-type: none"> 1. Understanding of the basic principles of Quantum Computing and Information. 2. Understand the Quantum Operations and Quantum Gates. 3. Understand the basic features of Quantum Coding and Algorithms. 4. Understand the Quantum Computational Complexity and Error Correction. 			
Module -1			
Foundation: Overview – Church-Turing Thesis – The circuit model of computation – reversible computation – quantum physics – quantum physics and computation – Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem – functions of operators – tensor products – Schmidt decomposition theorem. Textbook 1- Chapter 1(1.1,1.2,1.3,1.5,1.6,1.7) Chapter 2 (2.1,2.2,2.3,2.4,2.5,2.6,2.7)			
Module -2			
Qubits and Quantum Model of Computation Management: State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – quantum circuit model – quantum gates – universal sets of quantum gates – unitary transformations – quantum circuits. Textbook 1-Chapter 3(3.1,3.2,3.3,3.4,3.5) Chapter 4(4.1,4.2,4.3,4.4,4.5)			
Module -3			
Quantum Algorithms - 1: Superdense coding – quantum teleportation – applications of teleportation – probabilistic versus quantum algorithms – phase kick-back – the Deutsch algorithm – the Deutsch - Jozsa algorithm – Simons algorithm – Quantum phase estimation and quantum Fourier Transform – eigenvalue estimation. Textbook 1-Chapter 5(5.1,5.2,5.3) Chapter 6(6.1,6.2,6.3,6.4,6.5) Chapter 7(7.1,7.2)			
Module -4			
Quantum Algorithms - 2: Order-finding problem – eigenvalue estimation approach to order finding – Shor’s algorithm for order finding – finding discrete logarithms – hidden subgroups – Grover’s quantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – searching without knowing the success probability. Textbook 1-Chapter 7(7.3.1,7.3.3,7.3.4,7.4,7.5) Chapter 8(8.1-8.4)			
Module -5			
Quantum Computational Complexity and Error Correction: Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods – classical error correction – classical three-bit code – fault tolerance – quantum error correction – three- and nine-qubit quantum codes – fault-tolerant quantum computation. Textbook 1-Chapter 9(9.1-9.7) Chapter 10(10.1-10.6)			

Text Books:

1. Phillip Kaye, R. Laflamme, and M. Mosca, “An Introduction to Quantum Computing”, Oxford University Press, 2007.
2. V. Sahni, “Quantum Computing”, Tata McGraw-Hill Publishing Company, 2007.

Reference Books:

1. Quantum Computing and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, 10th Anniversary edition, Cambridge University Press, 2010.
3. Quantum Computing by Parag Lala, McGraw-Hill, Indian Edition, Reprint 2020.

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/106106232>
<https://archive.nptel.ac.in/courses/115/101/115101092/>
<https://www.ibm.com/quantum>

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2	Overview Church-Turing Thesis The circuit model of computation Reversible computation Quantum physics Quantum physics and computation
2	Week 3-4	Dirac notation and Hilbert Spaces Dual vectors Operators The spectral theorem Functions of operators
3	Week 5-6	Tensor products Schmidt decomposition theorem State of a quantum system Time evolution of a closed system Composite systems Measurement Mixed states and general quantum operations
4	Week 7-8:	Quantum circuit model Quantum gates Universal sets of quantum gates Unitary transformations Quantum circuits Superdense coding Quantum teleportation Applications of teleportation
5	Week 9-10	Probabilistic versus quantum algorithms Phase kick-back The Deutsch algorithm The Deutsch - Jozsa algorithm Simons algorithm Quantum phase estimation and quantum Fourier Transform Eigenvalue estimation
6	Week 11-12	Order-finding problem Eigenvalue estimation approach to order finding Shor's algorithm for order finding Finding discrete logarithms Hidden subgroups Grover's quantum search algorithm Amplitude amplification Quantum amplitude estimation

		Quantum counting Searching without knowing the success probability.
7	Week 13-14:	Computational complexity Black-box model Lower bounds for searching General black-box lower bounds Polynomial method Block sensitivity Adversary methods
8	Week 15-16:	Classical error correction Classical three-bit code Fault tolerance Quantum error correction Three- and nine-qubit quantum codes Fault-tolerant quantum computation.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of the concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies
6	Multiple Representations	Introduce topics in various representations to reinforce competencies
7	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
8	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

6 .Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

This section of regulations is applicable to all theory-based courses. The minimum CIE marks requirement is 40% of maximum marks in each component.

CIE Split up

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
TotalMarks				50	20

$$\text{FinalCIE Marks} = (A) + (B)$$

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

- 1.Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
- 2.There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
- 3.The students have to answer 5 full questions selecting one full question from each module.
- 4.Marks scored will be proportionally scaled down to 50 marks.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understand Quantum Mechanics Fundamentals	Gain a foundational understanding of quantum mechanics principles, including superposition, entanglement, and quantum states.
2	Develop Proficiency in Quantum Algorithms	Learning and implement key quantum algorithms, such as Shor's and Grover's algorithms, understanding their significance and applications.
3	Apply Mathematical Concepts to Quantum Computing	Use linear algebra, complex numbers, and probability theory to model and analyze quantum systems and processes.
4	Design and Simulate Quantum Circuits	Develop the ability to design quantum circuits and simulate them using quantum programming tools like Qiskit.
5	Explore Quantum Information Theory	Understand the concepts of quantum information, quantum entropy, and quantum error correction, and their applications in quantum communication.

8. Course Outcomes (Cos) and Mapping with Pos/ PSOs**Course Outcomes (Cos)**

CO'S	Description
M23BCS705A.1	Analyze the fundamental concepts and principles of quantum computing
M23BCS705A.2	Analyze the Qubits and Quantum Model of Computation Management
M23BCS705A.3	Evaluate and understand various Quantum Algorithms
M23BCS705A.4	Analyze and understand various Quantum Algorithms
M23BCS705A.5	Examine the various concepts of Quantum Computational Complexity and Error Correction

CO-PO-PSO Mapping

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PO112	PSO1	PSO2
M23BCS705A.1	3	2	-	-	3	-	-	-	-	-	-	3	3	
M23BCS705A.2	3	3	3	-	-	-	-	-	-	-	-		3	
M23BCS705A.3	-	3		2	-	-	-	-	-	-	-	3		
M23BCS705A.4	-	3	-	2	-	-	-	-	-	-	-	3		
M23BCS705A.5	-	-	3	-	-	-	-	-	-	-	-	-	3	
M23BCS705A	3	3	3	2								3	3	

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					
Module 2		10				
Module 3			10			
Module 4				10		
Module 5					10	
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					
Module 2		20				
Module 3			20			
Module 4				20		
Module 5					20	
Total	20	20	20	20	20	100

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks.

10. Future with this Subject

- The future with Quantum Computing is likely to involve several key trends and developments:
- Revolutionizing Cryptography: Quantum computers could break traditional cryptographic schemes, like RSA, by efficiently factoring large numbers. This will lead to the development of quantum-resistant encryption methods, securing data in a post-quantum world.
- Advancements in Drug Discovery and Material Science: Quantum computing could simulate molecular interactions at an unprecedented scale, enabling the discovery of new drugs and materials with properties tailored for specific purposes, potentially revolutionizing healthcare and materials engineering.
- Optimization and Problem-Solving: Quantum algorithms can solve complex optimization problems exponentially faster than classical algorithms. This could impact logistics, finance, manufacturing, and any field that relies on solving large-scale optimization problems.
- Artificial Intelligence and Machine Learning: Quantum computing could enhance machine learning algorithms, enabling faster training and more accurate models. This could lead to breakthroughs in AI applications, such as natural language processing, image recognition, and autonomous systems.
- Accelerating Scientific Research: Quantum computers can simulate quantum systems, aiding in the understanding of fundamental physics and chemistry. This could lead to new discoveries in quantum mechanics, particle physics, and other scientific fields, pushing the boundaries of our knowledge.
- Economic and Industrial Transformation: Quantum computing has the potential to create new industries, jobs, and economic growth. Companies and countries that invest in quantum technologies could gain a significant competitive advantage, leading to shifts in global economic power.

7th Semester	Professional Elective–IV (PE) Cryptography	M23BCS705B
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1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Mathematics	Number Theory: Understanding concepts like prime numbers, modular arithmetic, and Euler's theorem is crucial for many cryptographic algorithms. Abstract Algebra: Familiarity with groups, rings, and fields is important, especially for grasping encryption methods like RSA and elliptic curve cryptography. Probability and Statistics: Useful for analyzing the security of cryptographic systems and understanding concepts like randomness and entropy.
2.	Computer Science Fundamentals	Algorithms and Data Structures: Knowing how to efficiently implement and analyze algorithms is essential, as many cryptographic techniques involve complex computations and data manipulations. Complexity Theory: Understanding the computational complexity of algorithms helps in assessing their practicality and security.
3.	Discrete Mathematics	Combinatorics: Useful for understanding permutations, combinations, and other counting principles. Graph Theory: Relevant for certain cryptographic protocols and network security.
4.	Programming Skills	Scripting and Coding: Proficiency in programming languages (like Python, C++, or Java) is important for implementing and testing cryptographic algorithms and protocols.
5.	Understanding of Security Concepts	Basic Security Principles: Knowledge of concepts like confidentiality, integrity, and authentication is fundamental for designing and evaluating cryptographic systems. Network Security: Familiarity with protocols such as SSL/TLS and concepts like public key infrastructure (PKI) can be beneficial.

2. Competencies

S/L	Competency	KSA Description
1.	Number Theory	Understand prime numbers, modular arithmetic, and Euler's theorem. Apply concepts of greatest common divisor (GCD) and modular inverses.
2.	Cryptographic Algorithms and Techniques	Implement and understand block ciphers (e.g., AES) and stream ciphers.
3.	Protocols and Standards	Understand key exchange protocols, authentication protocols, and secure messaging. Implement and analyze protocols such as SSL/TLS, IPsec, and PKI.
4.	Implementation and Secure Coding	Code cryptographic algorithms and protocols in languages such as Python, C++, or Java. Ensure correct implementation and avoid common programming mistakes.
5.	Security Analysis and Evaluation	Analyze the security of cryptographic algorithms using formal methods and proofs. Evaluate potential attack vectors and cryptographic weaknesses.
6.	Legal and Ethical Considerations	Understand legal regulations related to cryptography, including data protection laws and export controls.

3. Syllabus

Cryptography (M23BCS705B)			
SEMESTER – VII			
Course Code	M23BCS705B	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 hours Theory	Total Marks	100
Credits	03	Exam Hours	03
Course objectives: This course will enable students to: <ul style="list-style-type: none"> ● Define cryptography and its principles ● Explain Cryptography algorithms ● Illustrate Public and Private key cryptography ● Explain Key management, distribution and certification 			

<ul style="list-style-type: none"> • Explain authentication protocols • Tell about IPSec
Module -1
Classical Encryption Techniques Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One Time Pad. Block Ciphers and the data encryption standard: Traditional block Cipher structure, stream Ciphers and block Ciphers, Motivation for the feistel Cipher structure, the feistel Cipher, The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule algorithm Textbook 1: Ch. 2.1,2.2, Ch. 3 RBT: L1, L2
Module -2
Public-Key Cryptography and RSA: Principles of public-key cryptosystems. Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA. Other Public-Key Cryptosystems: Diffie-hellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elgamal Cryptographic systems Textbook 1: Ch. 9, Ch. 10.1,10.2 RBT: L1, L2
Module -3
Elliptic curve arithmetic, abelian groups, elliptic curves over real numbers, elliptic curves over Z_p , elliptic curves over $GF(2^m)$, Elliptic curve cryptography, Analog of Diffie-hellman key exchange, Elliptic curve encryption/decryption, security of Elliptic curve cryptography, Pseudorandom number generation based on an asymmetric cipher, PRNG based on RSA. Key Management and Distribution: Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates. Textbook 1: Ch. 10.3-10.5, Ch.14.1 to 14.3 RBT: L1, L2
Module -4
X-509 certificates. Certificates, X-509 version 3, public key infrastructure .User Authentication: Remote user Authentication principles, Mutual Authentication, one way Authentication, remote user Authentication using Symmetric encryption, Mutual Authentication, one way Authentication, Kerberos, Motivation , Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, Mutual Authentication, one way Authentication. Electronic Mail Security: Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow. Textbook 1: Ch. 14.4, Ch. 15.1 to 15.4, Ch.19 RBT: L1, L2
Module -5
IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing, Encapsulating Security payload, ESP format, encryption and authentication algorithms, Padding, Anti replay service Transport and tunnel modes, combining security associations, authentication plus confidentiality, basic combinations of security associations, internet key exchange, key determinations protocol, header and payload formats, cryptographic suits. Textbook 1: Ch. 20.1 to 20.3 RBT: L1, L2
<p>Text Books:</p> <ol style="list-style-type: none"> 1. William Stallings: Cryptography and Network Security, Pearson 6th edition. 2. Cryptography and Network Security Behrouz A. Forouzan, De Anza College <p>Reference Books:</p> <ol style="list-style-type: none"> 1. V K Pachghare: Cryptography and Information Security, PHI 2nd Edition <p>Web links and Video Lectures (e-Resources):</p> <p>https://nptel.ac.in/courses/106105214</p> <p>https://www.youtube.com/playlist?list=PLBlNk6fEqyRiVhbXDGLXdk_OQAeuVcp20</p>

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week1: Introduction to Cryptography	<p>· Topics:</p> <ul style="list-style-type: none"> • History and importance of cryptography • Basic concepts: confidentiality, integrity, authentication • Overview of cryptographic systems and their applications <p>· Activities:</p> <ul style="list-style-type: none"> • Lecture on the history and evolution of cryptography • Introduction to basic cryptographic terminology
2	Week2: Mathematical Foundations	<p>· Topics:</p> <ul style="list-style-type: none"> • Number theory basics: primes, modular arithmetic • Introduction to algorithms: Euclidean algorithm, modular inverses <p>· Activities:</p> <ul style="list-style-type: none"> • Lecture on number theory and its relevance to cryptography • Problem sets on modular arithmetic and number theory
3	Week3: Abstract Algebra	<p>· Topics:</p> <ul style="list-style-type: none"> • Groups, rings, and fields • Applications to cryptographic algorithms <p>· Activities:</p> <ul style="list-style-type: none"> • Lecture on abstract algebra concepts • Exercises on group theory and their application in cryptograph
4	Week4: Symmetric Key Cryptography	<p>· Topics:</p> <ul style="list-style-type: none"> • Block ciphers: DES, AES • Modes of operation: ECB, CBC, CTR • Padding schemes and their importance <p>· Activities:</p> <ul style="list-style-type: none"> • Lecture on symmetric encryption algorithms • Hands-on lab: Implementing and testing AES • Reading: “Understanding Cryptography” (Chapters on AES and DES)
5	Week 5: Stream Ciphers and Their Applications	<p>· Topics:</p> <ul style="list-style-type: none"> • Stream ciphers: RC4, Salsa20 • Comparison with block ciphers <p>· Activities:</p> <ul style="list-style-type: none"> • Lecture on stream ciphers and their use cases • Coding exercise: Implementing a stream cipher
6	Week 6: Hash Functions	<p>· Topics:</p> <ul style="list-style-type: none"> • Properties and uses of hash functions • Cryptographic hash functions: MD5, SHA-1, SHA-2, SHA-3 • HMAC and its applications <p>Activities:</p> <ul style="list-style-type: none"> • Lecture on hash functions and their importance in cryptography • Hands-on lab: Implementing and analyzing hash functions

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies

6	Multiple Representations	Introduce topics in various representations to reinforce competencies
7	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
8	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

6 .Assessment Details (both CIE and SEE)

The Weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

$$\text{Final CIE Marks} = (\text{A}) + (\text{B})$$

Average internal assessment shall be the average of the 2 test marks conducted.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Fundamental Principles	Understand the basic principles of cryptography, including confidentiality, integrity, authenticity, and non-repudiation. Learn the difference between symmetric and asymmetric encryption and their use cases.
2	Cryptographic Algorithms	Study various cryptographic algorithms and protocols, such as DES, AES, RSA, and ECC.Learn how to implement and analyze these algorithms in practical scenarios.
3	Key Management	Understand key generation, distribution, and storage techniques. Learn the principles of key exchange protocols, such as Diffie-Hellman.
4	Cryptographic Protocols	Gain knowledge about cryptographic protocols, including SSL/TLS, IPsec, and others. Understand how these protocols secure communications over networks.
5	Hash Functions	Study hash functions like MD5, SHA-1, and SHA-256. Learn how hash functions contribute to data integrity and digital signatures.

8. Course Outcomes (Cos) and Mapping with Pos/ PSOs**Course Outcomes (Cos)**

Cos	Description
M23BCS705B.1	Understand cryptography basics, algorithms and mathematical background for cryptography.
M23BCS705B.2	Analyze the important cryptographic algorithms.
M23BCS705B .3	Apply Cryptographic algorithms for Encryption and KeyExchange in real time projects.
M23BCS705B.4	Apply the various Authentication schemes to simulate different applications
M23BCS705B.5	Realize the security threats caused by malware, design Firewall based solutions and access control techniques to solve societal security problems.

CO-PO-PSO Mapping

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
M23BCS705B.1	2	2	-	-	-	-	-	-	-	-	-	2	2	2
M23BCS705B.2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
M23BCS705B .3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
M23BCS705B.4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
M23BCS705B.5	-	2	2	3	3	-	-	-	-	-	-	-	-	-
M23BCS705B	2.25	2.2	2	3	3	-	-	-	-	-	-	-	2	2

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject**1. Post-Quantum Cryptography:**

Challenge: Quantum computers have the potential to break many of the cryptographic algorithms currently in use, such as RSA and ECC.

2. Advances in Cryptographic Algorithms:

Enhancements: Cryptographic algorithms will continue to evolve to address new security threats and improve efficiency.

Example: The development of lightweight cryptographic algorithms for resource-constrained environments like IoT devices.

3. Blockchain and Cryptocurrencies:

Expansion: Cryptography will remain central to blockchain technologies, ensuring secure transactions, smart contracts, and decentralized applications (DApps).

Innovation: Advances in blockchain technology and cryptographic techniques will drive the development of new financial systems, governance models, and digital identities.

7thSemester	Professional Elective-IV(PE) BUSINESS INTELLIGENCE AND ANALYTICS	M23BCB705C
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic Statistics:	Understanding of fundamental statistical concepts such as mean, median, mode, variance, standard deviation, correlation, and regression.
2	Probability:	Familiarity with basic probability theory, including probability distributions and probability rules.
3	Introductory Programming:	Knowledge of at least one programming language, such as Python or R, which are commonly used in data analysis and BI..
4	Introduction to Business Concepts:	Basic understanding of business processes, organizational structures, and key performance indicators (KPIs).
5	Information Systems:	Familiarity with the role of information systems in organizations, including data management systems, enterprise resource planning (ERP), and customer relationship management (CRM) systems.

2. Competencies

S/L	Competency	KSA Description
1	Data Management	Knowledge: Knowledge of how to structure and store data efficiently to ensure its integrity and accessibility. Skills: The ability to analyze complex datasets, identify trends and patterns. Attitudes: This involves understanding the strategic context of data analysis and using insights to influence business strategy.
2	Business Intelligence Concepts	Knowledge: Familiarity with the fundamental concepts of BI, such as data visualization, reporting, decision support systems, and key performance indicators (KPIs). Skills: Skill in developing script for analysis. Attitudes: Ability to Analyze business data efficiently.
3	Statistical and Analytical Techniques	Knowledge: Understanding how to apply these techniques to real-world business problems. Skills: The ability to approach business problems analytically, develop hypotheses, and use data to test and validate these hypotheses. Attitudes: The ability to quickly adapt to new tools, technologies, and methodologies in the rapidly evolving field of BI and Analytics.
4	Decision Support System	Knowledge: Knowledge of ANN, Decision support system. Skills: Skill on applying ANN knowledge and Decision support system. Attitudes: Ability to apply expert system.

3. Syllabus

BUSINESS INTELLIGENCE AND ANALYTICS SEMESTER – VII			
Course Code	M23BCB705C	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 Hours	Total Marks	100
Credits	03	Exam Hours	03
Course Objectives:			
<ol style="list-style-type: none"> 1. Explain the Business Intelligence, Analytics and Decision Support system 2. List the technologies for Decision making, Automated decision systems 3. Explain sentiment analysis techniques 4. Illustrate Multi-criteria Decision making systems, predictive modelling techniques 			
Module -1			
An Overview of Business Intelligence, Analytics, and Decision Support: Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview, Brief Introduction to Big Data Analytics.			
Module -2			

Decision Making: Introduction and Definitions, Phases of the Decision, Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components.

Module -3

Neural Networks and Sentiment Analysis: Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbour Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process., Sentiment Analysis, Speech Analytics.

Module -4

Model-Based Decision Making: Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spreadsheets, Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Multi-Criteria Decision Making With Pairwise Comparisons.

Module -5

Automated Decision Systems and Expert Systems: Automated Decision Systems, The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems.

Suggested Learning Resources:

Text Books:

1. Ramesh Sharda, DursunDelen, EfraimTurban, J.E.Aronson,Ting-Peng Liang, David King, “Business Intelligence and Analytics: System for Decision Support”, 10th Edition, Pearson Global Edition, 2013
2. Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback – 12 November 2017by Edward Mize.

REFERENCE BOOKS:

1. Kumar U. D: Business Analytics – The Science of Data – Driven Decision Making, Wiley.
2. Bowles M. : Machine Learning in Python – Essential Techniques for Predictive Analysis, Wiley.

1. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: An Overview of Business Intelligence, Analytics, and Decision Support	Introduction to concepts of Business Intelligence. Review of theory and concepts.. Basics data analytics and decision support system.
2	Week 4-6: Decision Making	Introduction to decision system. Phases of decision making system. Process of decision making system.
3	Week 8-11: Neural Networks and Sentiment Analysis	Introduction to Neural Networks and Sentiment Analysis.
4	Week 7-8: Model-Based Decision Making	Introduction to the structure of decision making system. Different decision making models.
5	Week 9-12: Automated Decision Systems and Expert Systems	Introduction to Automated decision system. Basics of expert system. Structure and applications of expert system.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Simulation	Use software simulations to mimic real-world business scenarios.
3	Group Projects and Collaborative Learning	Promote teamwork through group projects that require students to collaborate on analysis and decision-making.
4	Problem based Learning	Present students with real-world business problems to solve using BI tools.

5	Case Study based approach	Analyze case studies of companies that have successfully implemented BI and Analytics.
6	Labs and Workshops	Provide regular lab sessions where students can practice using BI tools like Tableau, Power BI, or SQL.

6. Assessment Details (both CIE and SEE)**Continuous Internal Evaluation:**

The minimum CIE marks requirement is 40% of maximum marks in each component.

CIE Split up

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
TotalMarks				50	20

FinalCIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

- Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
- There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
- The students have to answer 5 full questions selecting one full question from each module.
- Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Business Intelligence Concepts	Describe the role of BI in supporting strategic and operational decision-making in organizations.
2	Data Management and Preparation	Perform data extraction, transformation, and loading (ETL) processes to prepare data for analysis.
3	Analytical Skills Development	Apply statistical methods and data analysis techniques to interpret data and derive actionable insights.
4	Data Visualization and Reporting	Design and develop effective data visualizations that communicate insights clearly and concisely to stakeholders.
5	Real-World Application	Implement a comprehensive BI project that involves data collection, analysis, visualization, and reporting in response to a real-world business challenge.

8. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

Cos	Description
M23BCB705C.1	Able to analyze Business Intelligence, Analytics and Decision support.
M23BCB705C.2	Analyze and apply technologies for decision making.
M23BCB705C.3	Apply predictive modelling techniques
M23BCB705C.4	Apply sentiment analysis techniques
M23BCB705C.5	Develop NN model for analysis.

CO-PO-PSO Mapping

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB705C.1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
M23BCB705C.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
M23BCB705C.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
M23BCB705C.4	3	-	-	-	-	-	-	-	-	-	-	-	-	-
M23BCB705C.5	-	-	3	-	-	-	-	-	-	-	-	-	-	-
M23BCB705C	3	3	3	-	-	-	-	-	-	-	-	-	3	3

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject:

- **AI-Powered Analytics:** The integration of artificial intelligence (AI) and machine learning (ML) into BI will become more prevalent, leading to the development of more sophisticated predictive and prescriptive analytics.
- **Natural Language Processing (NLP):** NLP will allow users to interact with BI tools using conversational language, making data analysis more accessible to non-technical users.
- **IoT and Big Data:** The convergence of BI with IoT and Big Data will lead to new opportunities for analytics.
- **Lifelong Learning:** The rapid evolution of tools and technologies in BI and Analytics will require professionals to engage in lifelong learning.

7 th Semester	Professional Elective -IV (PE) FINANCIAL & COST ACCOUNTING	M23BCB705D
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic Accounting Principles:	Understanding of fundamental accounting principles, including the accounting equation, double-entry system, and basic financial statements.
2	Mathematics:	Proficiency in basic mathematics, including algebra and arithmetic, is essential for dealing with financial calculations and cost analysis.
3	Introduction to Business or Economics:	Familiarity with basic business concepts and economic principles helps in understanding the context in which financial and cost accounting operates.
4	Financial Management:	For more advanced studies, prior knowledge in financial management may be required to grasp complex financial strategies and decisions.

2. Competencies

S/L	Competency	KSA Description
1	Financial Knowledge	Knowledge: Understanding of financial principles, accounting standards (e.g., GAAP, IFRS), and cost accounting methods. Skills: Ability to analyze financial data, identify trends, and make informed decisions. Attitudes: Ability to evaluate financial scenarios and solve problems efficiently.
2	Regulatory Knowledge	Knowledge: Awareness of financial regulations, tax laws, and compliance requirements. Skills: Ability to analyze financial data. Attitudes: Proficiency in using accounting software (e.g., QuickBooks, SAP) and spread sheets for financial analysis.
3	Statistical and Analytical Techniques	Knowledge: Understanding of industry-specific financial practices or cost structures. Skills: Proficiency in financial analysis, communication, technical tools, and report preparation. Attitudes: Strong analytical thinking, attention to detail, and effective time management.

3. Syllabus

FINANCIAL & COST ACCOUNTING SEMESTER – VII			
Course Code	M23BCB705D	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hours	40 hours Theory	Total Marks	100
Credits	03	Exam Hours	03
Course Objectives:			
1. To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications			
2. To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements			
3. To create an awareness about cost accounting, different types of costing and cost management			
Module -1			
Accounting Concept: Introduction, Techniques and Conventions, Financial Statements- Understanding & Interpreting Financial Statements. Accounting Process: Book Keeping and Record Maintenance, Fundamental Principles and Double Entry, Journal, Ledger, Trial Balance, Cash Book and Subsidiary Books, Rectification of Errors.			
Module -2			
Financial Statements: Form and Contents of Financial Statements- Trading and Profit and Loss Account.			
Module -3			
Balance Sheet – Final Accounts-analyzing and Interpreting Financial Statements, Accounting Standards. Company Accounts: Audit Reports and Statutory Requirements (in the context of Annual Reports), Directors Report, Notes to Accounts, Pitfalls. Class Discussion: Corporate Accounting Fraud A Case Study of Satyam.			
Module -4			

Cash and Fund Flow: Introduction, How to prepare, Difference between them.

Module -5

Costing Systems: Elements of Cost, Cost Behavior, Cost Allocation, OH Allocation, Unit Costing, Process Costing, Job Costing, Absorption Costing and ABC Analysis. Class Discussion: Application of costing concepts in the Service Sector. Decision Making using costing (CASE STUDY)

Suggested Learning Resources:

Text Books:

1. Robert N Anthony, David Hawkins, Kenneth Marchant, Accounting: Texts and Cases, McGraw-Hill
2. Advanced Accounting by RL Gupta and Radhaswamy

Reference Books:

1. Advanced Accounting by MC Shukla and Grewal

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Accounting Concepts and Accounting process	Introduction to concepts of Accounting. Principles of Accounting process with problems.
2	Week 4-6: Financial Statements	Introduction to Financial statements, trending, profit, etc.
3	Week 8-11: Balance Sheet Company Account	Introduction to Balance sheet and basic concepts of Company Account.
4	Week 7-8: Cash and Fund Flow	Introduction to the concepts of Cash and Fund Flow. The difference between Cash and Fund
5	Week 9-12: Costing Systems	Introduction to Costing, elements of costing, cost allocation and costing process.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Group Projects and Collaborative Learning	Encourage teamwork through group assignments and projects.
3	Case Studies and Real-World Applications	Analyze real-world cases to apply theoretical concepts to practical scenarios.
4	Problem-Solving	Practice problem-solving skills through hands-on exercises and accounting problems.

6. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

The minimum CIE marks requirement is 40% of maximum marks in each component.

CIE Split up

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25	10
(ii)	Assignments/Quiz/Activity (B)	2	50%	25	10
Total Marks				50	20

Final CIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Fundamental Accounting Principles	Students will be able to explain and apply fundamental accounting principles, including the accounting equation, double-entry system, and the preparation of basic financial statements.
2	Mastering Cost Accounting Techniques	Students will learn to apply various cost accounting techniques such as job costing, process costing, activity-based costing, and standard costing.
3	Analyzing Financial Statements	Students will develop the ability to analyze and interpret financial statements to assess a company's financial performance and position.
4	Understanding Cost-Volume-Profit Analysis	Students will be able to perform cost-volume-profit (CVP) analysis to determine the breakeven point and understand the impact of changes in costs, volume, and prices on profitability.
5	Applying Management Accounting Techniques	Students will learn how to apply management accounting techniques to support decision-making processes within an organization.

8. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCB705D.1	Apply the Costing concepts and make decisions using Marginal costing concepts and budgets.
M23BCB705D.2	Apply the accounting process to process the accounting transactions leading to final statement of accounts.
M23BCB705D.3	Analyze the Annual Reports.
M23BCB705D.4	Prepare the FFS and CFS reports for given case.
M23BCB705D.5	Apply the Financial Accounting Concepts for the real-world problems.

CO-PO-PSO Mapping

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB705D.1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB705D.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
M23BCB705D.3	-	3	-	-	-	-	-	-	-	-	-	-	2	-
M23BCB705D.4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
M23BCB705D.5	3	-	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB705D	3	3	3	-	-	-	-	-	-	-	-	-	3	2.75

9. Assessment Plan**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	10					10
Module 2		10				10
Module 3			10			10
Module 4				10		10
Module 5					10	10
Total	10	10	10	10	10	50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	20					20
Module 2		20				20
Module 3			20			20
Module 4				20		20
Module 5					20	20
Total	20	20	20	20	20	100

10. Future with this Subject:

- **Automation and Artificial Intelligence (AI):** AI and automation are expected to handle more routine accounting tasks such as data entry, reconciliation, and even some aspects of financial analysis.
- **Blockchain Technology:** Blockchain offers secure, transparent, and tamper-proof methods for recording transactions.
- **IoT and Big Data:** The convergence of BI with IoT and Big Data will lead to new opportunities for analytics.
- **Digital Transformation of Finance Functions:** The digitalization of finance functions will streamline processes, improve accuracy, and enhance decision-making capabilities.

7th Semester	Professional Course Laboratory(PCL) IT Project Management	M23BCBL706
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1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Understanding of IT infrastructure.	Knowledge of software development, network systems, and IT infrastructure is essential.
2.	Software Development Lifecycle (SDLC)	Familiarity with how software is planned, designed, developed, tested, and maintained is key.
3.	Programming Basics	While not necessary to be a coder, having a grasp of programming concepts (languages like Python, Java, or SQL) can help in understanding project requirements.
4.	Project Management Concepts	Familiarity with concepts like scope, time, cost, quality, risk, and stakeholder management.
5.	Agile Certifications	Agile methodologies are increasingly popular in IT.

2. Competencies

S/L	Competency	KSA Description
1	Project Management Knowledge	Knowledge: Familiarity with project management methodologies (e.g., Waterfall, Agile, Lean). Skills: Ability to use project management software like JIRA or Microsoft Project. Attitudes: The capacity to analyze situations, foresee challenges, and implement solutions.
2	Technical Knowledge	Knowledge: Understanding of IT systems, software development processes, or cyber security fundamentals. Skills: Ability to clearly articulate project goals, deadlines, and deliverables to stakeholders. Attitudes: The natural capacity to inspire and guide a team toward achieving project goals.
3	Managing complex IT projects	Knowledge: Extensive knowledge of the Software Development Life Cycle (SDLC), IT infrastructure, cloud technologies, and cyber security protocols. Skills: Proficient in project management tools Attitudes: Ability to balance multiple projects while maintaining attention to detail and meeting deadlines.

3. Syllabus

IT Project Management SEMESTER – VII			
Course Code	M23BCBL706	CIE Marks	50
Number of Lecture Hours/Week(L: T: P: S)	0:0:2:0	SEE Marks	50
Total Number of Lecture Hours	24 Hours of Practical Session	Total Marks	100
Credits	01	Exam Hours	03
Course Objectives:			
<ol style="list-style-type: none"> To effectively plan, manage, execute, and control projects within the stipulated time To effectively manage cost targets with a focus on Information Technology and Service Sector To understand various agile project management techniques such as Scrum and DevOps 			
Project Overview and Feasibility Studies			
Project Identification, Market and Demand Analysis, Project Cost Estimate, Financial Appraisal.			
Project Scheduling			
Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship, Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.			
Cost Control and Scheduling			
Project Cost Control (PERT/Cost), Resource Scheduling & Resource Levelling.			
Project Management Features			
Risk Analysis, Project Control, Project Audit and Project Termination.			
Agile Project Management			
Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum, Lean, DevOps and IT Service Management (ITIL).			

Scrum

Various terminologies used in Scrum (Sprint, product backlog, sprint backlog, sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum.

List of Experiments:

1. Estimate the IT Project Cost and Control using open-source tools.
2. Scheduling a Project with PERT and CPM:
 1. Estimation of the total time required to complete the project if no delay
 2. The individual activities to meet the project completion time. Identify the critical bottleneck activities where any delays must be avoided to prevent delaying project completion.
3. IT project risk analysis using open-source tools.
4. Design IT Project Audit Template.
5. Agile Project Management Tools (Open source)
6. Design IT Service Management (ITIL) Templates
7. Scrum: IT Project Management, DevOps and Automated Testing Tools

Text books:

1. Mike Cohn, Succeeding with Agile: Software Development Using Scrum, 2015, 1st Edition Addison Wesley Professional.
2. Roman Pichler, Agile Product Management with Scrum: Creating Products that Customers Love, 2011, First edition, Addison-Wesley.

Reference Books:

1. Ken Schwaber, Agile Project Management with Scrum, 2014, 1st edition, Microsoft Press US.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week-1 Project Overview and Feasibility Studies	Project Identification, Market and Demand Analysis, Project Cost Estimate, Financial Appraisal. 1. Estimate the IT Project Cost and Control using open-source tools.
2	Week-2 Project Scheduling	Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship. 1. 2.1 Scheduling a Project with PERT and CPM: 1. Estimation of the total time required to complete the project if no delay
3	Week 3 Project Scheduling	Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.
4	Week 4 Cost Control and Scheduling	Project Cost Control (PERT/Cost), Resource Scheduling & Resource Levelling.
5	Week 5 Cost Control and Scheduling	2.2 The individual activities to meet the project completion time. Identify the critical bottleneck activities where any delays must be avoided to prevent delaying project completion.
6	Week 6 Project Management Features	Risk Analysis, Project Control, Project Audit and Project Termination. 3. IT project risk analysis using open-source tools.
7	Week 7: Agile Project Management	Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum. 4. Design IT Project Audit Template.
8	Week 8: Agile Project Management	DevOps and IT Service Management (ITIL). 3. Agile Project Management Tools (Open source)
9	Week 9: Scrum	Various terminologies used in Scrum (Sprint, product backlog, sprint backlog). 4. Design IT Service Management (ITIL) Templates
10	Week 10: Scrum	Sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum. 7. Scrum: IT Project Management, DevOps and Automated Testing Tools
11	Week 11: Scrum	Scrum: IT Project Management, DevOps and Automated Testing Tools

12	Week 12: Execute all the lab program along with test.	Scrum: IT Project Management, DevOps and Automated Testing Tools
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5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Real-World Case Studies and Scenarios	Incorporating real-world examples can make learning more engaging and relevant.
2	Project-Based Learning	Engage students by having them work on real or simulated projects, applying what they learn in a practical setting.
3	Use of Project Management Software and Tools	Familiarizing students with industry-standard helps bridge theory and practice.

6. Assessment Details (both CIE and SEE)

Marks distribution for Program based Practical Course for CIE

Sl. No.	Description	% of Marks	In Marks
1	Observation, write-up, algorithm /program / execution	80% of the maximum	80
2	Viva-Voce	20% of the maximum	20
Total		100%	100

Marks scored by the student for 100 are scaled down to 50 marks.

SEE for practical Course (Irrespective of Experiment or program based):

Marks distribution for Experiment based Practical Course for Final CIE

SL. No.	Description	% of Marks	Marks
1	Write-up, Procedure	20%	20
2	Conduction and result	60%	60
3	Viva-Voce	20%	20
Total		100%	100

- SEE marks for practical course shall be 50 marks
- SEE for practical course is evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
- Change of experiment/program is allowed only once and 20% marks allotted to the procedure/write-up part to be made zero.
- Duration of SEE shall be 3 hours.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understand the Project Management Lifecycle.	Students should be able to explain the phases of the project management lifecycle, including initiation, planning, execution, monitoring, and closure.
2	Develop Project Planning and Scheduling Skills	Students will learn to create project plans and schedules, including defining scope, setting timelines, and managing resources.
3	Apply Risk Management Techniques	Students should be able to identify, assess, and manage project risks.
4	Utilize Project Management Tools and Software	Students will become familiar with commonly used project management tools
5	Master Resource and Budget Management	Students will learn how to plan, allocate, and control resources and budgets within projects.

8. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M23BCBL706.1	To understand Project Management activities and to identify basic project management skills with a strong emphasis on issues and problems associated with delivering successful IT projects.
M23BCBL706.2	To Develop activity network to use PERT and to manage project risks such as Resource scheduling and cost control.
M23BCBL706.3	To understand the concept of Agile Project Management and IT Service Management and

M23BCBL706.4	To understand the various terminologies and best practices followed in scrum.
M23BCBL706.5	To demonstrate the working of IT Project Management with various tools and technologies.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCBL706.1	3											2	2	
M23BCBL706.2			3		3								2	3
M23BCBL706.3	3													
M23BCBL706.4	3												2	
M23BCBL706.5					3									3
M23BCBL706	3		3		3							2	2	3

9. Assessment Plan (For PCL)**Continuous Internal Evaluation (CIE)**

	CO1	CO2	CO3	CO4	CO5	Total
Program 1 to 7	5	10	10	5	20	50
Total	5	10	10	5	20	50

10.**Semester End Examination (SEE)**

	CO1	CO2	CO3	CO4	CO5	Total
Program 1 to 7	10	20	20	10	40	100
Total	10	20	20	10	40	100

10. Future with this Subject:

Greater Integration of Cyber security Practices: As cyber security threats grow, project managers will need to prioritize security in every phase.

Block chain for Project Transparency: Block chain technology offers transparency, accountability, and traceability, which can be valuable in project management.

Advanced Risk Management: With projects becoming more complex, advanced risk management tools are necessary to identify and mitigate risks effectively.

7thSemester	Project Work (PW) MAJOR PROJECT PHASE-II	M23BCB707
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Project Planning and Management	Basic understanding of project management principles, acquired from earlier project work and theoretical courses.
2	Experimental Design and Analysis	Knowledge of experimental techniques and data analysis from core and elective courses.
3	Technical Documentation	Competence in technical writing and report drafting.
4	Application of Theoretical Knowledge	Strong foundation in the relevant engineering principles.
5	Team Collaboration	Experience in group projects and collaborative learning environments.

2. Competencies

S/L	Competency	KSA Description
1	Project Execution	Knowledge: Understanding of project planning, scheduling, and resource management. Skill: Ability to carry out practical work systematically and efficiently. Attitude: Proactive and solution-oriented approach to problem-solving.
2	Data Analysis	Knowledge: Advanced knowledge of data analysis techniques. Skill: Proficiency in interpreting and analyzing experimental data. Attitude: Analytical mindset with a focus on accuracy.
3	Technical Communication	Knowledge: Mastery of technical documentation standards. Skill: Ability to draft comprehensive project reports. Attitude: Precision and clarity in communication.
4	Presentation Skills	Knowledge: Understanding of audience engagement techniques. Skill: Ability to deliver clear and impactful presentations. Attitude: Confidence and professionalism in public speaking.
5	Collaboration	Knowledge: Awareness of effective teamwork strategies. Skill: Ability to work collaboratively in multidisciplinary teams. Attitude: Respect and openness to diverse perspectives.

3. Project Timeline

S/L	Timeline	Description
1	Week 1-2	Review of problem statement and project plan; setting milestones.
2	Week 3-4	Experimental setup and initial trials.
3	Week 5-6	Data collection and analysis; troubleshooting.
4	Week 7-8	Progress review and mid-term evaluation.
5	Week 9-10	Refinement of experiments and final data analysis.
6	Week 11-12	Drafting the final report.
7	Week 13-14	Presentation preparation and practice.
8	Week 15	Final project presentation and submission of the report.

4. Course Objectives

- To execute the project work based on the defined problem statement.
- To develop skills in practical application, experimentation, and analysis.
- To enhance project management, report writing, and presentation skills.

5. Assessment Details (both CIE and SEE)**CIE procedure for Project Work Phase-II:**

(1) **Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the project work shall be based on the evaluation of the project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(2) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

SEE procedure for Project Work Phase-II: SEE for project work will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25.

6. Learning Objectives

S/L	Learning Objectives	Description
1	To execute the project plan effectively.	Students will apply their theoretical knowledge to practical tasks, managing the project from start to finish.
2	To analyze data and refine project outcomes.	Students will enhance their skills in data interpretation and problem-solving.
3	To document and present the project work comprehensively.	Students will develop a final report and presentation that reflects their project work accurately.

7. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M23BCB707.1	Successfully execute the project plan and achieve the defined objectives.
M23BCB707.2	Analyze and interpret experimental data to derive meaningful conclusions.
M23BCB707.3	Demonstrate the ability to apply engineering and management principles effectively within a team, managing project timelines, resources, and deliverables to achieve project goals.
M23BCB707.4	Prepare and present a comprehensive project report.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB707.1			3		3				3		3		3	3
M23BCB707.2	3	3		3		3					3		3	3
M23BCB707.3			3				3						3	3
M23BCB707.4								3		3	3	3	3	3
M23BCB707	3	3	3	3	3	3	3	3	3	3	3	3	3	3

8. Future with this Subject

This phase solidifies the student's ability to independently execute complex engineering projects. The experience gained here is directly transferable to their future academic endeavors, and professional roles in engineering.

8th Semester	Seminar (SR) TECHNICAL SEMINAR	M23BCB803
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Research and Information Gathering	Familiarity with academic research and access to digital libraries or databases.
2	Content Organization and Report Writing	Basic knowledge of report writing, including the use of Microsoft Word, equation editors, and drawing tools.
3	Technical Presentation Skills	Experience with PowerPoint or other presentation software, as well as fundamental public speaking skills.
4	Critical Thinking and Discussion	Experience in group discussions and the ability to analyze and critique technical content.
5	Originality and Integrity in Work	Understanding the importance of originality in academic work.

2. Competencies

S/L	Competency	KSA Description
1	Effective Research and Literature Review	Knowledge: Familiarity with technical literature, research databases, and citation practices. Skill: Ability to conduct a thorough literature review and identify key sources of information. Attitude: Curiosity and a proactive approach to learning.
2	Report Writing and Documentation	Knowledge: Understanding of technical writing formats, structure, and referencing. Skill: Proficiency in using word processors, equation editors, and drawing tools to create clear and concise reports. Attitude: Attention to detail and commitment to producing high-quality, original work.
3	Presentation and Communication	Knowledge: Understanding of effective communication techniques and presentation design. Skill: Ability to deliver clear, engaging presentations using visual aids. Attitude: Confidence and professionalism in public speaking.
4	Critical Engagement and Discussion	Knowledge: Familiarity with group discussion dynamics and debate techniques. Skill: Ability to engage with peers, ask relevant questions, and respond thoughtfully to feedback. Attitude: Openness to different viewpoints and willingness to engage in constructive criticism.
5	Ethical Standards and Academic Integrity	Knowledge: Understanding of the principles of academic honesty and the consequences of plagiarism. Skill: Ability to produce original work and properly cite all sources. Attitude: Integrity and responsibility in academic work.

3. Syllabus Timeline

S/L	Timeline	Description
1	Week 1-2: Topic Selection and Literature Review	Students will select a seminar topic relevant to their specialization and conduct a literature review to gather information.
2	Week 3-4: Content Organization and Report Drafting	Organize the gathered information into a coherent structure and begin drafting the seminar report.
3	Week 5: Report Writing and Formatting	Focus on refining the report, ensuring proper formatting, citation, and use of tools like equation editors and drawing tools.
4	Week 6: Presentation Preparation	Prepare the PowerPoint slides and practice the oral presentation, focusing on clarity and engagement.
5	Week 7: Seminar Presentation and Discussion	Deliver the seminar presentation, engage in a Q&A session, and participate in group discussions.
6	Week 8: Report Submission and Final Evaluation	Submit the final report and undergo a comprehensive evaluation by the faculty committee.

4. Assessment Details

The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the Technical Seminar shall be based on the evaluation of the report, presentation skill, and question and answer session in the ratio of 50:25:25.

5. Learning Objectives

S/L	Learning Objectives	Description
1	Conduct In-Depth Research on a Technical Topic	Students will learn to independently research a technical topic, gather and analyse information, and synthesize it into a coherent understanding.
2	Develop and Deliver a Technical Presentation	Students will gain experience in creating and delivering professional technical presentation, enhancing their communication skills.
3	Engage in Technical Discussions and Debates	Students will enhance their critical thinking and discussion skills by engaging with peers in technical debates.
4	Prepare a Detailed Technical Report	Students will learn to write a detailed, well-organized technical report, ensuring proper citation and originality.

6. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCB803.1	Conduct comprehensive research and organize technical content for a seminar presentation.
M23BCB803.2	Prepare and deliver a clear and engaging technical presentation using appropriate tools and techniques.
M23BCB803.3	Engage in technical discussions, respond to queries, and participate in group debates effectively.
M23BCB803.4	Produce a well-structured, original technical report with proper citations and references.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB803.1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB803.2	-	3	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB803.3	-	-	3	-	-	-	-	-	-	-	-	-	3	3
M23BCB803.4	-	-	-	3	-	-	-	-	-	-	-	-	3	3
M23BCB803	3	3	3	3	-	-	-	-	-	-	-	-	3	3

8th Semester	Internship (IS) INTERNSHIP	M23BCB804
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1. Prerequisites

S/L	Proficiency	Prerequisites
1	Understanding of fundamental concepts in the chosen field of study.	Successful completion of core courses related to the field of study.
2	Ability to analyze and solve complex problems using discipline-specific methodologies.	Analytical and problem-solving skills gained through prior coursework and lab work.
3	Capability to conduct independent research or work effectively within an industrial setup.	Experience with project-based learning or relevant coursework that involved team collaboration.
4	Communication and technical writing for the preparation of reports and presentations.	Courses in communication skills and technical writing.
5	Understanding of ethical, social, and environmental responsibilities in professional practices.	Knowledge of professional ethics and sustainable practices.

2. Competencies

S/L	Competency	KSA Description
1	Research Methodology	Knowledge: Understanding of current research trends and methodologies in the chosen field. Skill: Ability to design and conduct experiments or studies, analyze data, and draw conclusions. Attitude: Curiosity and commitment to scientific inquiry and continuous learning.
2	Practical Application	Knowledge: Familiarity with industry standards and practical applications of theoretical concepts. Skill: Ability to apply theoretical knowledge to solve real-world problems in an industrial or rural context. Attitude: Adaptability and willingness to learn from real-world experiences.
3	Presentation and Communication	Knowledge: Understanding of effective communication techniques and presentation design. Skill: Ability to deliver clear, engaging presentations using visual aids. Attitude: Confidence and professionalism in public speaking.
4	Communication and Presentation	Knowledge: Techniques for effective communication, both written and oral. Skill: Ability to prepare and present technical reports and presentations. Attitude: Confidence in public speaking and openness to feedback.
5	Teamwork and Collaboration	Knowledge: Principles of team dynamics and collaborative working. Skill: Ability to work effectively as part of a team, contributing to shared goals. Attitude: Cooperative mindset and respect for diverse perspectives.
6	Professionalism and Ethics	Knowledge: Understanding of professional ethics and legal responsibilities. Skill: Ability to make ethical decisions and demonstrate professional behavior in all activities. Attitude: Integrity and responsibility in professional conduct.

3. Assessment Details

The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide/Mentor. The CIE marks awarded for the Internship shall be based on the evaluation of the report, presentation skill, and question and answer session in the ratio of 50:25:25.

4. Learning Objectives

S/L	Learning Objectives	Description
1	Understand and Apply Research Methodologies or Industry Practices	Students will gain an understanding of current research methodologies in their chosen field or industry practices in the professional setting. They will learn how to apply these methodologies or practices to real-world problems, fostering their ability to conduct independent research or contribute effectively in an industrial environment.
2	Develop Problem-Solving Skills in Real-World Contexts	Students will enhance their problem-solving abilities by working on practical issues encountered in research, industry, or rural settings. They will learn to analyze complex problems, develop viable solutions, and implement them effectively.
3	Improve Communication and Technical Writing Skills	Students will refine their communication skills, both in writing and orally. They will learn how to prepare clear and concise technical reports and deliver presentations that effectively communicate their findings and ideas to diverse audiences.
4	Foster Teamwork and Collaborative Skills	Through collaborative projects, students will develop their ability to work effectively in teams. They will learn how to contribute to group efforts, manage interpersonal dynamics, and achieve shared goals in a professional environment.
5	Cultivate Professionalism and Ethical Responsibility	Students will understand the importance of professionalism and ethical behavior in their work. They will learn to make responsible decisions that consider the broader social, environmental, and ethical implications of their actions.

5. Course Outcomes (COs) and Mapping with POs/ PSOs**Course Outcomes (COs)**

COs	Description
M23BCB804.1	Demonstrate the ability to apply research methodologies or industry practices to solve complex problems in a real-world context.
M23BCB804.2	Develop and implement effective solutions to technical challenges encountered during the internship, showcasing problem-solving skills.
M23BCB804.3	Communicate technical information clearly and effectively through well-structured reports and presentations.
M23BCB804.4	Demonstrate knowledge and understanding of engineering and management principles, applying them in a team to manage projects in multidisciplinary environments.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
M23BCB804.1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
M23BCB804.2	-	3	-	-	-	-	-	-	-	-	-	-		3
M23BCB804.3	-	-	3	-	-	-	-	-	-	-	-	-	3	3
M23BCB804.4	-	-	-	3	-	-	-	-	-	-	-	-	3	3
M23BCB804	3	3	3	3	-	-	-	-	-	-	-	-	3	3