

Syllabus

for

Second Year Engineering

Semester III and IV

Department of Information Technology

With Effect from Academic Year 2024-25


Ramrao Adik Institute of Technology

Credit structure -Semester-III

Course Code	Course Category	Course Name	Contact Hours			Credits Assigned			
			TH	PR	Tut	TH	PR	Tut	Total
231ITUCC31	Programme Core Course	Data Structure and Analysis	3	--	--	3	--	--	3
231ITUCC32	Programme Core Course	Database Management Systems	3	--	--	3	--	--	3
231ITUMM31	MDM-I Multidisciplinary Minor	Engineering Mathematics III	2	--	--	2	--	--	2
231ENUOE11	OE I (Open Elective) Other than a particular programme	Human Resource Management	2	--	--	2	--	--	2
231ENUOE12		Macroeconomics							
231ENUOE13		Disaster Management and Mitigation Measures							
231ENUOE14		Ethics for IT Users							
231ENUOE15		Innovation and Creativity							
231ENUAE31	Ability Enhancement Course	Professional Communication and Ethics	2	--	--	2	--	--	2
231ENUHS31	Humanities Social Science and Management	Entrepreneurship Development and Management	2	--	--	2	--	--	2
231ENUVE31	Value Education Course	Environmental Science	2	--	--	2	--	--	2
231ITUVS31	Vocational Skill Enhancement Course	Skill Based Lab I – Java	--	4	--	--	2	--	2
231ITUCL31	Programme Core Course Lab	Data Structure and Analysis Lab	--	2	--	--	1	--	1
231ITUCL32	Programme Core Course Lab	Database Management Systems Lab	--	2	--	--	1	--	1
Total			16	8	--	16	4	--	20

Evaluation Scheme: Semester-III

Course Code	Course Category	Course Name	Internal Assessment				Uni. Exam	IA	Uni. Exam	Total
			IA1	IA2	AV G	MS E	ESE	TW	OR/PR	
231ITUCC31	Programme Core Course	Data Structure and Analysis	20	20	20	20	60	--	--	100
231ITUCC32	Programme Core Course	Database Management Systems	20	20	20	20	60	--	--	100
231ITUMM31	MDM- I Multidisciplinary Minor	Engineering Mathematics III	15	15	15	10	50	--	--	75
231ENUOE11	OE I (Open Elective) Other than a particular programme	Human Resource Management	15	15	15	10	50	--	--	75
231ENUOE12		Macroeconomics								
231ENUOE13		Disaster Management and Mitigation Measures								
231ENUOE14		Ethics for IT Users								
231ENUOE15		Innovation and Creativity								
231ENUAE31	Ability Enhancement Course	Professional Communication and Ethics	15	15	15	10	50	--	--	75
231ENUHS31	Humanities Social Science and Management	Entrepreneurship Development and Management	15	15	15	10	50	--	--	75
231ENUVE31	Value Education Course	Environmental Science	15	15	15	10	50	--	--	75
231ITUVS31	Vocational Skill Enhancement Course	Skill Based Lab I - Java	--	--	--	--	--	25	25	50
231ITUCL31	Programme Core Course Lab	Data Structure and Analysis Lab	--	--	--	--	--	25	25	50
231ITUCL32	Programme Core Course Lab	Database Management Systems Lab	--	--	--	--	--	25	25	50
Total			--	--	115	90	370	75	75	725

 <div>D Y PATIL DEEMED TO BE UNIVERSITY —RAMRAO ADIK— INSTITUTE OF TECHNOLOGY NAVI MUMBAI</div>		B.TECH IN INFORMATION TECHNOLOGY				SECOND YEAR SEM- III	
Course Code	Course Name	Teaching Scheme (Contact Hours 45)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ITUCC31	Data Structures and Analysis	3	-	-	3	3	
		Evaluation Scheme					
		Theory Marks				End Sem. Exam	Total
		Internal Assessment					
		IA1	IA2	Avg of IA	Mid Sem Exam		
		20	20	20	20		

Course Objectives:

1. A fundamental understanding of the core principles of stacks, queues, and linked lists.
2. A foundational understanding about the principles of Trees, Graphs, and related data structures.
3. The knowledge of different analysis of algorithms, sorting, searching, hashing and recursion techniques
4. The ability to comprehend and apply diverse algorithm design strategies.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Employ the concepts of stacks and queues to address real-world problems effectively.
2. Utilize the principles of linked lists to solve practical problems.
3. Apply, categorize, and analyze tree and graph concepts for real-life problem-solving scenarios.
4. Identify the time and space complexity of an algorithm.
5. Evaluate sorting, searching methods within the context of solving real-world problems.
6. Comprehend the use and application of advanced design paradigms.

Prerequisite: C Programming.


Module No	Contents	Hrs. (45)	CO
1.	Stacks and Queues	8	CO1
	Introduction and Definition of Data Structure, Data types – primitive and non-primitive, Types of Data Structures- Linear & Non Linear Data Structures, Stack: Introduction, Operations on the Stack, Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion. Queue: Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Circular Queue, Double Ended Queue, Priority Queue		
2.	Linked List Linked List and its types, Array and Dynamic Implementation of Linked List, Insertion, deletion, update and copying operations with Singly linked lists, doubly linked lists and circular linked lists. Reversing a singly linked list. Polynomial Manipulation.	8	CO2
3.	Trees and Graphs Introduction to Tree, Tree Terminology, Binary Tree, Binary Search Tree, Methods, Strictly Binary Tree, Complete Binary Tree, Tree Traversal methods, Threaded Binary Tree, Expression Tree. Introduction to Graphs: Undirected Graph, Directed Graph, graph terminology, Connectivity in Undirected and Directed Graphs. Spanning tree. Representation of graph: adjacency matrix, adjacency list, Traversals: Breadth First Search, Depth First Search and Shortest Path Algorithms.	8	CO3
4.	Introduction to analysis of algorithm Different Approaches to Designing an Algorithm, Time and Space Complexity: Worst-case, Average-case, Best-case, Algorithm Efficiency, Big O Notation, Omega Notation (Ω), Theta Notation (Θ). Introduction to complexity classes: P, NP, NP-Hard and NP-Complete complexity Classes	5	CO4
5.	Searching and Sorting Searching: Sequential Search, Binary Search. Hashing: Hash Functions: Truncation, Mid-square Method, Folding Method, Division Method. Collision Resolution: Open Addressing: Linear Probing, Quadratic Probing, Double Hashing, Separate Chaining Bucket Hashing. Analysis of all searching techniques, Divide and Conquer, Sorting: Insertion sort, Selection sort, Merge sort, Quick sort and Radix sort. Analysis of all sorting techniques	9	CO5
6.	Design Paradigm Greedy Algorithms: Fractional Knapsack, Prim's and Kruskal's algorithms, Dynamic Programming: 0/1 Knapsack, Backtracking: N Queen problem	7	CO6

Text Books:

1. Yedidya Langsam, Moshej Augenstein, Aaron M. Tenenbaum, Data Structure Using C & C++ ,Prentice Hall of India , 1996.
2. Reema Thareja, Data Structures using C Oxford.

Reference Books:

1. Ellis Horowitz, SartajSahni, Fundamentals of Data Structures Galgotia Publications; 2010.
2. Jean Paul Tremblay, Paul G. Sorenson, An introduction to data structures with applications, TataMcGrawHill 1984.
3. Rajesh K. Shukla, Data Structures using C and C++, Wiley India 2009.
4. Maria Rukadikar, Data Structure and Algorithm, SPD 1st Edition 2017
5. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, MIT Press and McGraw-Hill, Fourth edition.

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Course Code	Course Name	Teaching Scheme (Contact Hours 45)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ITUCC32	Database Management Systems	3	-	-	3	3	
		Evaluation Scheme					
		Theory Marks				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		20	20	20			20

Course Objectives:

1. To explore the basic concepts of databases, including data models, schema design, ER Model and relational algebra.
2. To learn Structured Query Language (SQL) for querying and manipulating data within databases and techniques for designing well-structured databases and applying normalization to optimize data storage.
3. To learn about transaction processing, concurrency control, and recovery management to maintain data integrity.
4. To Introduce the fundamentals of PL/SQL and query processing

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand Database System Concepts and Design ER Model.
2. Create Relational Model for real life applications.
3. Write SQL queries for data retrieval, manipulation, and management.
4. Apply Normalization techniques to relational database design.
5. Demonstrate the concept of transaction, concurrency and recovery.
6. Understand query processing and query optimization.

Prerequisite: C Programming.

Module No	Contents	Hrs. (45)	CO
1.	Database System Concepts and The ER Model Introduction, Characteristics of Databases, File system v/s Database system, Data abstraction and Data Independence, DBMS system architecture, Database Administrator (DBA), Types of Databases(Relational, Non-Relational, Temporal, Spatial, Mobile), The Entity Relationship (ER) Model, Entity Type, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Weak entity Types Generalization, Specialization and Aggregation, Extended Entity-Relationship (EER) Model.	7	CO1
2.	Relational Model And Relational Algebra Introduction to Relational Model, Relational Model Constraints and Relational Database Schemas, Concept of Keys: Primary Key, Secondary key, Foreign Key, Mapping the ER and EER Model to the Relational Model, Introduction to Relational Algebra, Relational Algebra expressions for Unary Relational Operations, Set Theory operations, Binary Relational operation Relational Algebra Queries	8	CO2
3.	Structured Query Language (SQL) Overview of SQL, Data Definition Commands, Set operations, aggregate function, null values, Data Manipulation commands, Data Control commands, Complex Retrieval Queries using Group By, Recursive Queries, nested Queries, Integrity constraints in SQL. Database Functions and Procedures in SQL	8	CO3
4.	Relational Database Design Design guidelines for relational Schema, Functional Dependencies, The need for normalization, Improving the design, Definition of Normal Forms- 1NF, 2NF, 3NF & The Boyce-Codd Normal Form (BCNF). lossy and lossless decomposition, dependency preserving decomposition. Introduction to cursor.	8	CO4
5.	Transactions Management and Concurrency and Recovery Transaction: Transaction concept, State Diagram, ACID Properties, Transaction Control Commands, Concurrent Executions, Serializability – Conflict and View, Concurrency Control: Lock-based-protocols, Deadlock handling Timestamp-based protocols, Recovery System: Recovery Concepts, Log based recovery	7	CO5
6.	Query Processing and Optimization Overview of query processing, measures of query cost, selection, sorting, join evaluation of expressions. Overview of query optimization, Transformation of Relational Expressions, Estimating Statistics of Expression Results.	7	CO6


Text Books:

1. Korth, Silberchatz, Sudarshan, Database System Concepts, McGraw Hill, 6th Edition
2. Elmasri and Navathe, Fundamentals of Database Systems, Pearson education, 6th Edition

Reference Books:

1. Peter Rob and Carlos Coronel, Database Systems Design Implementation and Management, Thomson Learning, 9th Edition.
2. P.S. Deshpande, SQL & PL / SQL for Oracle 11g Black Book, Dreamtech Press.
3. G. K. Gupta, Database Management Systems, McGraw – Hill

4. Rob, Coronel, Database Systems, Cengage Learning, Seventh Edition.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theory	Total
231ITUMM31	Engineering Mathematics III	2	-	-	2	2
		Evaluation Scheme				
		Theory Marks				Total
		Internal Assessment			End Sem. Exam	
		IA1	IA2	Avg of 2 IA		
		15	15	15	10	

Course Objectives:

1. To provide the requisite and relevant background necessary to understand other important engineering mathematics courses offered for Engineers.
2. To introduce three important topics of applied mathematics, viz., Laplace transforms, Z-Transform and Fourier series.
3. To identify the direction and strength of a linear correlation between two factors and each source of variation in an analysis of regression for data analysis.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Demonstrate ability to manipulate matrices and compute Eigen values and Eigen vectors.
2. Understand the concept of Laplace transform and inverse Laplace transform of various functions and apply the concept of Z- transform to analyze the discrete-time signals and systems.
3. Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic function.
4. Expand the periodic function by using Fourier series in terms of sine and cosine functions.
5. Apply the concept of probability distribution to the engineering problems.
6. Apply the concept of Correlation and Regression to the engineering problems.

Module No	Contents	Hrs. (30)	CO
1.	Linear Algebra: Eigen Values and Eigen vectors and their properties, Cayley-Hamilton theorem, Similarity of matrices and its properties, Diagonalization of matrices	7	CO1


2.	Laplace Transform: Definition and condition of Existence of Laplace transform, Laplace transform of standard functions (No Proof of formulas), properties (without proofs)	5	CO2
3.	Fourier Series: Definition, Dirichlet's conditions, Euler's formulae, Fourier series in $(C, C + 2L)$, Fourier series in $(0, 2L)$, Fourier series in $(-L, L)$, Fourier series of even and odd function.	5	CO3
4.	Statistical Techniques: Karl Pearson's coefficient of correlation, covariance, Spearman's Rank correlation., Lines of Regression.	4	CO4
5.	Random Variables: Discrete & continuous random variables, expectation, Variance, Probability mass function and Density Function, Probability distribution: Introduction to Binomial distribution.	5	CO5
6.	Relations: Sets, Cartesian products of Sets, Relations and their properties, diagraphs of relation, matrix of relation, closure, equivalence relations, partial orders, Hasse Diagram of partial order.	4	CO6

Text Books:

1. H.K. Das, Advanced Engineering Mathematics, S. Chand, 2008.
2. Gupta and Kapoor, Fundamentals of Mathematical Statistics, 1st Edition, S. Chand and Sons.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publication.

Reference Books:

1. B. S. Tyagi, Functions of a Complex Variable, Kedarnath Ram Nath Publication
2. Wylie and Barret, Advanced Engineering Mathematics, Tata Mc-Graw Hill 6th Edition
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, Inc
4. Howard Anton and Christ Rorres. Elementary Linear Algebra Application Version. 6th edition. John Wiley & Sons, INC.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE11	Human resource Management	2	-	-	2	2	
		Evaluation Scheme					
		Theory Marks				End Sem Exam	Total
		Internal Assessment					
		IA1	IA2	Avg of 2 IA	Mid Sem Exam		
		15	15	15	10		

Course Objectives:

1. To understand and appreciate the importance of the human resources for an organization.
2. To familiarize the students with methods and techniques of HRM.
3. To equip them with the application of the HRM tools in real world business situations

Course Outcomes:

On successful completion of course, learner/student will be able to

- 1 To study the basic concept and challenges in Human resource management
- 2 To explore the roles and responsibilities of HRM
- 3 To understand the functions and activities of HR
- 4 To gain core knowledge of strategic management of HR
- 5 To acquire knowledge of human resource planning.
- 6 To know and discover HRM in service sector.

Module No	Contents	Hrs · (30)	CO
1	Human Resource Management: Concept and Challenges, HR Philosophy, HR Policies, Procedures and Practices.	04	CO1


2	Human Resource System Design: HR Profession, and HR Department, Line Management Responsibility in HRM, Measuring HR, Human resources accounting and audit, Human resource information system	04	CO2
3	Functional Areas of HRM: Recruitment and staffing, Benefits, compensation, employee relations, HR compliance, Organizational design, training and development, Human resource information systems (H.R.I.S.) and payroll.	06	CO3
4	Human Resource Planning: Demand Forecasting, Action Plans—Retention, Training, Redeployment & Staffing, Succession Planning	04	CO4
5	Strategic Management of Human Resources: Strategic Management of Human Resources, Relationship between HR strategy and overall, Corporate strategy, HR as a Factor of Competitive Advantage, Managing Diversity in the Workplace.	06	CO5
6	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: Impact on HR practices Stressing mainly on performance, Flexible working Practices: Implications for HR.	06	CO6

Text Books:

1. Garry Dessler & Varkkey, Human Resource Management, Pearson, New Delhi, 2009
2. Alan Price, Resource Management, Cengage Learning, NewDelhi, 2007
3. PravinDurai, Resource Management, Pearson, New Delhi,2010
4. Snell, Bohlander& Vohra, Resource Management, Cengage, New Delhi, 2010

Reference Books:

1. VenkataRatnam C. S. & Srivatsava B. K.,Personnel Management and Human Resources, Tata Mc-Graw Hill, New Delhi.
2. Aswathappa, Human Resource Management, Tata McGraw Hill, NewDelhi, 2010.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theory	Total
231ENUOE12	Macro- Economics	2	-	-	2	2
		Evaluation Scheme				
		Theory				Total
		Internal Assessment			End Sem. Exam	
		IA1	IA2	Avg of 2 IA		
		15	15	15	10	50

Course Objectives:

1. Explain essential economic principles, main macroeconomic concerns.
2. Explain essential economic principles in a modern economy.
3. Explain different perspectives in macroeconomics.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand needs, functions, roles, scope and evolution of Management
2. Understand importance, purpose of Planning and hierarchy of planning and analyse its types.
3. Discuss Decision making, Organizing, Staffing, Directing and Controlling.
4. Select the best economic model from various available alternatives.
5. Understand various interest rate methods and implement the suitable one.
6. Estimate various depreciation values of commodities.

Module No	Contents	Hrs. (30)	CO
1	Management: Introduction - Meaning - nature and characteristics of Management, Scope and Functional areas of management - Management as a science, art of profession - Management & Administration - Roles of Management, Levels of Management, and Development of Management Thought- early management	04	CO 1


	approaches – Modern management approaches. Planning: Nature, importance and purpose of planning process Objectives - Types of plans (Meaning Only) - Decision making Importance of planning - steps in planning & planning premises - Hierarchy of plans.		
2	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). Directing & Controlling: Meaning and nature of directing Leadership styles	06	CO2
3	Engineering and economics: Engineering and economics, Problem solving and decision making, Laws of demand and supply, Difference between Microeconomics & Macroeconomics, equilibrium between demand & supply, elasticity of demand, price elasticity, income elasticity. Law of Returns, Interest and interest factors, simple and compound interest, Cash flow diagrams, personal loans and EMI payment calculation with flexible interest rates, Discussion and problems	06	CO3
4	Present, future and annual worth and rate of returns: Basic present worth comparisons, Present worth equivalence, Assets with unequal lives and infinites lives, future worth comparisons, payback comparisons, Equivalent annual worth comparisons, situations for annual worth comparisons. Asset life, Rate of return, minimum acceptable rate of return, IRR anomalies and misconceptions, Cost of capital, comparisons of all present future and annual worth with IRR, product costing, Discussions and problems.	06	CO4
5	Costing: Components of costs, estimation of selling price, marginal cost, first cost, all kinds of overheads, indirect cost estimation with depreciation, mensuration and estimation of material cost, cost estimation of mechanical process, idling time.	04	CO5
6	Depreciation: (approaches to product costing), causes of depreciation, methods of computing depreciation charges, straight line method, declining balance method, sum of years method, sinking fund method, service output methods, taxation concepts, personal income taxes and corporate taxes, Discussions and problems.	04	CO6

Text Books:

1. Mechanical estimation T.R. Banga & S.C. Sharma Khanna Publishers 17th edition
2. Engineering Economy Riggs J.L McGraw Hill 4th edition

Reference Books:

1. Engineering Economy Thuesen H.G PHI 2002
2. Principles of Management Tripathy and Reddy Tata McGraw Hill 3rd edition 2006

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE13	Disaster Management And Mitigation Measures	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of IA			Mid Sem Exam
		15	15	15			10
		50	75				

Course Objectives:

1. To understand the various types of disaster occurring around the world.
2. To identify extent and damaging capacity of a disaster.
3. To study and understand the means of losses and methods to overcome /minimize it.
4. To understand role of individual and various organization during and after disaster.
5. To know warning systems, their implementation and based on this to initiate training to a laymen.
6. To understand application of GIS in the field of disaster management.
7. To understand the emergency government response structures before, during and after disaster.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Acquire fundamentals of disasters, long term effects global warming, perspective and concepts of human life.
2. Understand natural as well as man-made disaster and their extent and possible effects on the economy.
3. Planning of national importance structures based upon the previous history.
4. Understand government policies, acts and various organizational structure associated with an emergency.
5. Know the simple do's and dont's in such extreme events and act accordingly.
6. Know the preventive and mitigation disaster measures.

Module No	Contents	Hrs (30)	CO
1	Introduction: Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change.	05	CO1
2	Natural Disaster and Manmade disasters: Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion. Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.	05	CO2
3	Disaster Management, Policy and Administration: Disaster management: meaning, concept, importance, objective of disaster management policy, disaster risks in India, Paradigm shift in disaster management. Policy and administration: Importance and principles of disaster management policies, command and co-ordination of in disaster management, rescue operations-how to start with and how to proceed in due course of time, study of flowchart showing the entire process.	05	CO3
4	Institutional Framework for Disaster Management in India: Importance of public awareness, Preparation and execution of emergency management programme. Scope and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India. Methods and measures to avoid disasters, Management of casualties, set up of emergency facilities, importance of effective communication amongst different agencies in such situations. Use of Internet and softwares for effective disaster management. Applications of GIS, Remote sensing and GPS in this regard.	05	CO4


5	Financing Relief Measures: Ways to raise finance for relief expenditure, Role of government agencies and NGO's in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO's and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams. International relief aid agencies and their role in extreme events.	05	CO5
6	Preventive and Mitigation Measures: Pre-disaster, during disaster and post-disaster measures in some events in general, Structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication. Non-Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans. Do's and dont's in case of disasters and effective implementation of relief aids.	05	CO6

Text Books:

1. Harsh K.Gupta, "Disaster Management", Universities Press Publications.
2. O.S. Dagur, "Disaster Management: An Appraisal of Institutional Mechanisms in India", published by Centre for land warfare studies, New Delhi, 2011.
3. Damon Copolla, "Introduction to International Disaster Management", Butterworth Heinemann Elsevier Publications.
4. Jack Pinkowski, "Disaster Management Handbook", CRC Press Taylor and Francis group.

Reference Books:

1. RajdeepDasgupta, "Disaster management & rehabilitation", Mittal Publications, New Delhi.
2. R B Singh, "Natural Hazards and Disaster Management, Vulnerability and Mitigation", Rawat Publications.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE14	Ethics For IT Users	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10	50	75

Course Objectives:

1. Ethics for IT users is designed to educate existing and future business managers and IT professionals on the tremendous impact ethical issues play in the use of information technology in the modern business world.
2. The topics covered in this course are extremely current and relevant to anyone preparing to enter the field of IT.
3. This course will give students the foundation they need to make appropriate decisions when faced with difficult situations and make a positive impact in the field of information technology.

Course Outcomes: On successful completion of course, learner/student will be able to

1. Understand the concept of Ethics in Information Technology
2. Learn the importance of good business Ethics.
3. Learn the ethics necessary for IT Professionals and IT Users
4. Develop awareness for internet crimes
5. Learn about privacy protection and laws
6. Understand the need for quality checks and other issues in software development

Module No	Contents	Hrs (30)	CO
1	Introduction: Ethics in general, Ethics in business, Ethics in information technology, Applied Ethics, Personal Ethics,	04	CO1


	Integrity, Important Test for Morals and Integrity: Truth/Lie, Forms of Lies.		
2	Ethics in the Business World: Recent Scandals in IT Companies, The Sarbanes-Oxley Act (SOX), Fostering Good Business Ethics, Gaining the Goodwill of the Community, Creating an Organization That Operates Consistently, Good Ethics Can Mean Good Business, Protecting the Corporation Its Employees from Legal Actions.	04	CO2
3	Ethics for IT Professionals and IT Users: IT Professionals, Are IT Workers Professionals?, Relationships Between IT Professionals and Employers, Relationships Between IT Professionals and Clients, Legal Overview, Relationships Between IT Professionals and Suppliers, Distinguishing Between a Bribe and a Gift, Relationships b/w IT Professionals & Other Professionals, Relationships Between IT Professionals and IT Users, Relationships Between IT Professionals and Society, The Ethical Behaviour of IT Professionals, Ethical Practices of IT Users	06	CO3
4	Computer and Internet Crime: IT Security Incidents: A Worsening Problem, Increasing Complexity Increases Vulnerability, Increased Reliance on Commercial Software with Known Vulnerabilities, Types of Attacks, Classifying Perpetrators, Prevention, Detection, Response,	06	CO4
5	Privacy: Privacy Protection And The Law, Key Privacy And Anonymity Issues, Governmental Electronic Surveillance, Data Encryption, Identity Theft, Consumer Profiling, Treating Consumer Data Responsibly, Workplace Monitoring, Spamming, Advanced Surveillance Technology,	04	CO5
6	Software Development: Impact of Quality Software, Key Issues in Software Development, Liability, Reasons for Software Defects, Quality Software, Software Development Process, Software Quality Assurance (QA), Safety-Critical Systems, Quality Management Standards, Manager's Checklist for Improving Software Quality.	06	CO6

Text Books:

1. George Reynolds, Ethics in Information Technology, Thomson Course Technology, 2007. ISBN 13: 978-1-4188-3631-3

Reference Books:

1. Richard T. DeGeorge, Business Ethics, 7th ed. Pearson India, 2014.

 <div>D Y PATIL DEEMED TO BE UNIVERSITY —RAMRAO ADIK— INSTITUTE OF TECHNOLOGY NAVI MUMBAI</div>		B.TECH IN INFORMATION TECHNOLOGY				SECOND YEAR SEM- III	
Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE15	Innovation and Creativity	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10	50	75

Course Objectives:

1. To involve themselves in the innovation and creative activities
2. Starting innovative practices in their entrepreneurial activities.
3. Developing their skills on the traits that they want to carry forward.
4. Starting activities based on the search of new ideas.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand to creativity and innovation terminologies
2. Explore personal and organizational roadblocks in participating in the creative process
3. Apply practical tips to discover the innovative /creative potential within the human being.
4. Understand different ways to protect innovation, basics on Patents and process
5. Formulate an Appropriate innovative ideation methods and theories of outsourcing.
6. Identify the system approach to Micro and Macro Perspective of Innovation.

Module No	Contents	Hrs (30)	CO
1	Introduction to concepts of creativity / invention / innovation and their importance in present knowledge world. Components of the creative process, Analogy/model to represent the creative process.	5	CO1


2	Understanding persons' Creative potential. Blockages in practicing creative process – Mindset and belief systems. Myths and misconceptions about creativity.	5	CO2
3	Practical Tips to discover and apply one's creative potential, remove blockages, deal with external factors. Importance of synergistically working in a team. Harnessing creativity from nature	5	CO3
4	Idea conception ,Idea Brainstorming sessions, Idea Evaluation, Protection/Patent review, Principles of innovation, Review of systematic strategies and methods for innovation, Innovation case study, Review of Idea/Prototype /Product and Market Plan.	5	CO4
5	Innovation Management: Concept of Innovation- Levels of Innovation- Incremental Vs Radical Innovation-Inbound and Outbound Ideation- Open and Other Innovative Ideation Methods- Theories of outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories	5	CO5
6	Micro and Macro Perspectives of Innovation: Systems Approach to Innovation, Innovation in the context of Emerging Economies- Organizational factors affecting innovation at the firm level Leadership and Innovations- Open Innovation- Innovation Framework Innovations developed by Open Technology Communities.	5	CO 6

Text Books:

1. Pradip N Khandwalla, Lifelong Creativity, An Unending Quest, Tata McGraw Hill, 2004.
2. Vinnie Jauhari, Sudanshu Bhushan, Innovation Management, Oxford Higher Education, 2014.
3. Innovation Management, C. S. G. Krishnamacharyulu, R. Lalitha, Himalaya Publishing House, 2010.

Reference Books:

1. A.DaleTimpe, Creativity, Jaico Publishing House, 2003. 5. Brian Clegg, Paul Birch, Creativity, Kogan Page, 2009.
2. P. N. Rastogi, Managing Creativity for Corporate Excellence, Macmillan 2009.

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Course Code	Course Name	Teaching Scheme(Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUAE 31	Professional Communication s and Ethics	02	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10		50

Course Objectives

1. Discern and develop an effective style of writing important technical/business documents.
2. Investigate possible resources and plan a successful job campaign.
3. Analyze personal traits, interests, values, aptitudes and skills.
4. Understand the dynamics of professional communication required for career enhancement.
5. develop creative and critical thinking required for effective workplace communication.
6. Understand what it means to act with integrity and have a personal code of ethics for regulating organizational behaviour.

Course Outcomes: Learners will be able to

1. Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
2. Strategize their personal and professional skills to build a professional image and meet the demands of the industry.
3. Gain expertise in preparing job search documents meeting the industry trends.
4. Merge successful in professional project presentations, group discussions and result oriented agreeable solutions in group communication situations.
5. Apply critical and creative thinking to overcome workplace challenges by understanding professional relationships.
6. Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.

Module No	Contents	Hrs. (30)	CO
1	<p>MODULE 1 - ADVANCED TECHNICAL WRITING</p> <p>1.1. Purpose and Classification of Reports</p> <p>1.2. Parts of a Long Formal Report</p> <ul style="list-style-type: none"> • Prefatory Parts (Front Matter) • Report Proper (Main Body) • Appended Parts (Back Matter) <p>1.3. Language, Formatting and Referencing of a Report</p> <ul style="list-style-type: none"> • Referencing Styles in APA , MLA& IEEE Format • Proofreading through Plagiarism Checkers <p>1.4. Definition, Purpose & Types of Proposals</p> <ul style="list-style-type: none"> • Solicited & Unsolicited Proposals • Requests for Proposals (RFP) • Types of Proposal (Memorandum & Letter) <p>1.5. Parts of a Memorandum Format Proposal</p> <ul style="list-style-type: none"> • Elements of Structure • Purpose of the Proposal(Problem and Need) • Background • Description of Plan • Particulars • Evidence of Ability to Deliver • Scope and Limitations • Benefits of the Proposal • Conclusion <p>1.6. Technical Paper Writing</p> <ul style="list-style-type: none"> • Parts of a Technical Paper • Language and Formatting • Referencing in IEEE Format 	08	CO1
2	<p>MODULE 2 - EMPLOYMENT SKILLS</p> <p>2.1. Group Discussions</p> <ul style="list-style-type: none"> • Purpose of a GD • Parameters of Evaluating a GD • Types of GDs (Factual, Controversial, Abstract, Case-based & Role Plays) • GD Etiquettes • Dos and Don'ts of a GD <p>2.2. Cover Letter & Resume</p> <ul style="list-style-type: none"> • Parts and Content of a Cover Letter • Difference between Bio data, Resume & CV • Essential Parts of a Resume • Types of Resume (Chronological, Functional & Combination) <p>2.3 Personal Interviews</p>	05	CO3

	<ul style="list-style-type: none"> • Areas of Preparation Prior to Interview • Areas and Types of Questions • List of Commonly Asked Questions • Types of Interviews (Structured, Stress, Behavioural, Problem Solving & Case Based) • Modes of Interviews (Face-to-face, Telephonic) 		
3	<p>MODULE 3 - MANAGING BUSINESS MEETINGS AND DOCUMENTATION</p> <p>3.1. Understanding Business Meetings</p> <ul style="list-style-type: none"> • Types of Meetings (Informative, Consultative & Executive) • Problem Solving Procedures • Decision Making Methods (By Authority, Majority Voting, Consensus, Unanimity) <p>3.2. Planning & Scheduling Meetings</p> <ul style="list-style-type: none"> • Roles & Responsibilities of Chairman, Secretary, Members Before, During and After a Meeting , • Meeting Etiquette • Planning of a Meeting (Agenda) • Scheduling of a Meeting (Notice) <p>3.3. Meeting Documentation</p> <ul style="list-style-type: none"> • Note Taking • Creating Future Action Plans • Minutes of a Meeting 	04	CO2
4	<p>MODULE 4 -TECHNICAL/ BUSINESS PRESENTATION SKILLS</p> <p>4.1. Effective Presentation Strategies</p> <ul style="list-style-type: none"> • Defining Purpose • Analysing Audience , location and Event • Gathering, Selecting & Structuring Material • Structuring a Presentation • Types of Presentations Aids • Using the Body & Voice for Maximum Impact • Closing a Presentation <p>4.2. Ways to Make Effective Slides Avoid:</p> <ul style="list-style-type: none"> • Too Small Text • Full Sentences Instead of Bullet Points • Poor Colour Choice & Contrast • Moving / Flying Text or Graphics • Annoying Use of Sounds • Overly Complex Charts and Diagrams • Too Many Different Fonts • Images That Do Not Fit in With the Context 	03	CO4
5	<p>MODULE 5 - DEVELOPING INTERPERSONAL SKILLS & WORK ETHICS</p> <p>5.1. Interpersonal Skills & Organisational Behaviour</p> <ul style="list-style-type: none"> • Emotional Intelligence 	08	CO5


	<ul style="list-style-type: none"> • Leadership • Negotiation & Conflict Management • Time Management • Team Building • Motivation <p>5.2.Introduction to Intellectual Property Rights</p>		
6	<p>Module 6: Etiquette and Manners</p> <ul style="list-style-type: none"> • Social Etiquette <ol style="list-style-type: none"> 1. Shaking Hands 2. Exchanging Business Cards 3. Introducing Self/Colleague/Classmate • Cubical Etiquette • Dining Etiquette • Responsible Use of Social Media • Email Etiquette 	02	CO6

LIST OF ASSIGNMENTS FOR TERMWORK

1. Preparing Questionnaire for survey, Memo Report/ Letter Report
2. Preparing a Business/Technical Proposal
3. Meeting Documentation (Notice, Agenda & Minutes)
4. Preparing the 'Cover Letter and Resume'.
5. Case studies and Role Plays on Interpersonal Skills , Corporate Ethics and Etiquettes (Evaluation will be based on the active participation of the students during classroom interactive sessions)

Text Books

1. Arms, V. M. (2005). *Humanities for the engineering curriculum: With selected chapters from Olsen/Huckin: Technical writing and professional communication, second edition*. Boston, MA: McGraw-Hill.
2. Bovée, C. L., & Thill, J. V. (2021). *Business communication today*. Upper Saddle River, NJ: Pearson
3. Butterfield, J. (2017). *Verbal communication: Soft skills for a digital workplace*. Boston, MA: Cengage Learning.
4. Masters, L. A., Wallace, H. R., & Harwood, L. (2011). *Personal development for life and work*. Mason: South-Western Cengage Learning.
5. Robbins, S. P., Judge, T. A., & Campbell, T. T. (2017). *Organizational behaviour*. Harlow, England: Pearson.
6. Meenakshi Raman, Sangeeta Sharma (2004) *Technical Communication, Principles and Practice*. Oxford University Press
7. Archana Ram (2018) *PlaceMentor, Tests of Aptitude For Placement Readiness*. Oxford University Press
8. Sanjay Kumar & PushpLata (2018). *Communication skills a workbook*, New Delhi: Oxford University Press.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUHS31	Entrepreneurship Development and Management	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10		50

Course Objectives:

1. To explain concepts of Entrepreneurship and build an understanding about business situations in which entrepreneurs act.
2. To qualify students to analyse the various aspects, scope and challenges under an entrepreneurial venture.
3. To explain classification and types of entrepreneurs and the process of entrepreneurial project development.
4. To discuss the steps in venture development and new trends in entrepreneurship.

Course Outcomes:

On successful completion of course, learner/student will be able to:

1. Explain Foundation of Entrepreneurship Development and its theories.
2. Explore entrepreneurial skills and management function of a company with special reference to SME sector.
3. Identify the type of entrepreneur and the steps involved in a marketing entrepreneurial venture.
4. Recognize various steps involved in starting a venture.
5. Explore marketing methods & new trends in entrepreneurship for financial management.
6. Develop skills for entrepreneurship development and management using case studies.


Module No	Contents	Hrs. (30)	CO
1.	Entrepreneurship: Meaning and Importance, Factors influencing entrepreneurship, Characteristics of an entrepreneur, Types of entrepreneur, Barriers to entrepreneurship, Skills of an entrepreneur.	04	CO1
2.	Operations Management: Production Forecasting, Planning And Control, Integrative nature of Production Plans, Maintenance Management, Preventive maintenance system, Materials Management, Inspection & Quality Control, Inventory Management, Case Studies	06	CO2
3.	Marketing Management: Needs, Wants and Demands, Demand Management, Company Orientation, Environmental Scanning, Marketing Mix, New Product Development, Test Marketing, Product Life Cycle, Marketing Research and Consumer Behaviour, Sales Management And Promotion, Territory Management, Sales Promotional Techniques, Product Pricing, Advertising And Branding	06	CO3
4.	General Management & Business Environment: Schools of Management Thought, Classical Management School, Levels of Management, Functions of Management, Business and Environment, Business Environment in developed and developing countries, Business Ethics, Social Responsibility of business, Ecological Environment, Indian Business Environment, Co-Operative Management, International Business Environment.	06	CO4
5.	Financial Management: Accounting Process, Accounting Concepts & Conventions, Ledger, Understanding Financial Statement, Working Capital : Determination & Calculation, Long-Term Source of Finance, Costing, Service Tax-Law & Practice.	05	CO5
6.	Case Studies & Problems: Analysis with B.E. Point and P/V Ratio, Preparation of Cash Budget, Problems on Standard Costing, Cash Flow Statement, Problem as Working Capital Requirement Forecast, Problems on Journal & Ledger.	03	CO6

Text Books:

1. R. K. Singal , “Entrepreneurship Development & Management”, S.K. Kataria& Sons, January 2013
2. Norman M Scarborough, “Essentials Of Entrepreneurship And Small Business Management”, 8th Edition, Pearson, November 2015

Reference Books:

1. S.S.Khanka, C.B.Gupta CB, “Entrepreneurship and Small Business Management” Sultan Chand & Sons, 2023.
2. Vasant Desai, “Entrepreneurship: Development and Management”, Himalaya Publishing House, 2015.

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Course Code	Course Name	Teaching Scheme(Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUVE31	Environmental Science	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10	50	75

Course Objectives:

1. To develop an integrated approach to environmental issues with a focus on sustainability
2. To enable learners to recognize the physical, chemical, and biological components of the earth's systems and relate their interdependence
3. To understand the temporal dimension of the environment, including what forces have created the contemporary environment and what effects current behavior may have on future environments

Course Outcomes: Students will be able to:

1. Implement scientific, technological, economic and political solutions to environmental problems
2. Apply the idea for creating alternate possibilities to deal with environmental threat issues due to pollution
3. Identify and develop different kinds of eco-friendly measures on personal and social level
4. Develop sustainable interaction methods among humans and in between humans and natural world
5. Interpret and apply basic environmental regulations and ethics to assess socio-environmental conditions.
6. To reduce pollution and degradation of the environment and efficiently using energy, water and other resources.


Module No	Contents	Hrs. (45)	CO
01	Energy and Ecosystem Public awareness of environmental education Global crisis related to – Population, water, sanitation & Land. Study of ecosystems: Forest, desert and aquatic Energy flow in Ecosystem: overview of Food Chain, Food Web and	4	CO1

	Ecological Pyramid. Concept of ecological succession and its impact on human beings		
02	Sustainable Development and Climate change Concept and Definition of Sustainable Development. Social, Economical and Environmental aspects of sustainable development. Control measures: 3R (Reuse, Recovery, Recycle), Resource utilization as per the carrying capacity (in brief).	3	CO2
03	Pollution and Control Sources, effects and control of water, soil, land, air, noise and e-pollution. Greenhouse effect, Photochemical Smog Nuclear pollution: Sources and effects. Case study on London smog Case Study of Fukushima Disaster	8	CO3
04	Pollution Control Legislation Functions and powers of Central and State Pollution Control Board. Environmental Clearance, Consent and Authorization Mechanism. Case Study of Dombivali MIDC- Boiler Blast Tragedy (Thane, Maharashtra, India), (May, 2016).	4	CO4
05	Renewable Sources of Energy Importance of renewable sources of energy. Solar Energy, Wind Energy, Hydropower, Geothermal Energy	6	CO5
06	Disaster Management Carbon Credit: Introduction and general concept. Techniques of Disaster Management to cope up with (i) Earthquake and (ii) Flood. Case Study on Earthquake in Latur (Maharashtra, India), Case Study on Cloudburst and Landslides at Kedarnath (Uttarakhand, India)	5	CO6

Reference Books:

1. Environmental Studies by Benny Joseph, TataMcGraw Hill.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.

3. Environmental Studies by. AnanditaBasak, Pearson Education.
4. Essentials of Environmental Studies by Kurian Joseph & Nagendran, Pearson Education.
5. Fundamentals of Environmental Studies by Varadbal G. Mhatre, Himalaya Publication House.
6. Perspective of Environmental Studies, by Kaushik and Kaushik, New Age International.
7. Renewable Energy by Godfrey Boyle, Oxford Publications.
8. Textbook of Environmental Studies by Dave and Katewa, Cengage Learning.
9. Textbook of Environmental studies by ErachBharucha, University Press.
10. Environmental pollution control engineering by C.S. Rao, New Age International (P) Limited Publishers.

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Course Code	Course Name	Teaching Scheme (Contact Hours 2/week)			Credits Assigned	
		Theory	Practical	Tutorial	Lab	Total
231ITUVS31	Skill Based Lab I - Java	-	4	-	2	2
		Evaluation Scheme				
		Practical / Oral / Practical & Oral				Total
		Term Work	Oral	Practical		
		25	25	-		

Lab Objectives:

1. To understand the concepts of object-oriented paradigm in the Java programming language.
2. To understand the concepts of classes, objects, members of a class, and the relationships among them is needed for finding the solution to a specific problem.
3. To learn the principles of packages, inheritance, interfaces and Multithreading.
4. To learn designing, implementing, testing, and debugging graphical user interfaces in Java using AWT and Swing.

Lab Outcomes: On successful completion of course, learner/student will be able to

1. Understand the fundamental concepts of Java Programming.
2. Implement the solution for a specific problem based on the concepts of classes, objects, members of a class and the relationships.
3. Implement various string operations.
4. Implement various programs based on abstract classes, inheritance, interfaces and packages.
5. Implement inbuilt exception handling functions with user defined exception handling, implement multithreading operations.
6. Design and develop Graphical User Interface using Abstract Window Toolkit and Swing along with event handling.

Prerequisites:

C Programming, object-oriented concept

Suggested list of experiments:


Expt. No.	Title of Experiment	CO Mapping
1.	Write a menu-driven java program to perform factorial, Palindrome, Prime number,	LO1
2.	Implement a java program to calculate gross salary & net salary taking the following data.	LO1
3.	Write a program to print the area of a rectangle by creating a class named 'Area' having two methods. First method named as 'setDim' takes length and breadth of rectangle as parameters and the second method named as 'getArea' returns the area of the rectangle. Length and breadth of rectangle are entered through the keyboard.	LO2
4.	WAP to demonstrate various string functions (Take input using Buffered Reader).	LO3
5.	Write a JAVA program to calculate area and volume of rectangle using multilevel inheritance demonstrating method overriding.	CO4
6.	Create an interface vehicle and classes like bicycle, car, bike etc., having common functionalities and put all the common functionalities in the interface. Classes like Bicycle, Bike, car etc. implement all these functionalities in their own class in their own way.	LO4
7.	WAP to generate a year using a random class and check whether it is leap or not using a user defined package.	LO4
8.	Write a program to print series $1/1! + 2/2! + \dots + N/n!$ Sum at each step and reverse series 10-1 using multi-threading make use of Interrupted Exception.	LO5
9.	Write a java program to demonstrate the use of AWT components namely buttons, labels, text boxes, lists/combos, menus with event handling.	LO6
10.	Write a java program to design a calculator using Java Swing components	LO6
11.	Capstone Project	LO6

Text Books:

1. Herbert Schildt, "JAVA: The Complete Reference", Ninth Edition, Oracle Press.
2. Sachin Malhotra and Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2010

Reference Books:

1. Jaime Nino, Frederick A. Hosch, 'An introduction to Programming and Object Oriented Design using Java', Wiley Student Edition.
2. E Balgurusamy, "Programming with JAVA", Tata McGraw Hill.

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Course Code	Course Name	Teaching Scheme (Contact Hours 2/week)			Credits Assigned	
		Theory	Practical	Tutorial	Lab	Total
231ITUCL31	Data Structures and Analysis Lab	-	2	-	1	1
		Evaluation Scheme				
		Practical / Oral / Practical & Oral				Total
		Term Work		Oral	Practical	
		25		--	25	
					50	

Course Objectives:

1. Acquire proficiency in the core principles of stacks, queues, linked lists, and their respective operations.
2. Develop a strong understanding of Binary Trees and Binary Search Trees at their fundamental level.
3. Explore the concepts of searching, hashing, and sorting techniques.
4. Discover the practical uses and real-world applications of linked lists, stacks, queues, trees, and graphs.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Explore and analyze how Stack methods can be applied to solve a variety of real-world problems
2. Illustrate and assess the utility of Linear Queue, Circular Queue, and Double Ended Queue methods in addressing real-time issues.
3. Examine the practical applications of various types of Linked List methods in solving diverse real-world problems.
4. Illustrate and analyze how Tree methods can be effectively utilized to address real-time challenges and scenarios.
5. Explore the versatility of Graph methods in tackling a wide range of real-world problems.
6. Demonstrate the practical use of sorting and searching techniques in solving real-world challenges and scenarios.

Prerequisite: C Programming.

Suggested list of experiments:

Expt. No.	Title of Experiment	LO Mapping
1.	<p>A Shop has a stack of chocolate boxes each containing a positive number of chocolates. Initially, the stack is empty. During the next N minutes, either of these two things may happen:</p> <ul style="list-style-type: none"> • The box of chocolates on top of the stack gets sold • You receive a box of chocolates from the warehouse and put it on top of the stack. <p>Determine the number of chocolates in the sold box each time he sells a box.</p>	CO1
2.	<p>You are tasked with designing a simple billing system for a supermarket. Customers will join a queue to pay for their items at the checkout counter. Demonstrate how a queue data structure can be applied to simulate a supermarket billing system.</p>	CO2
3.	<p>You are tasked with designing a ticket booking system for a cinema. Customers can book tickets, and the system should handle booking requests efficiently. The cinema has a fixed number of seats, and once all seats are booked, new customers will have to wait until there are available seats due to cancellations. Demonstrate how a circular queue data structure can be applied to efficiently manage ticket bookings in a cinema</p>	CO2
4.	<p>You're tasked with creating a task scheduling system capable of managing tasks with varying levels of priority. To ensure efficient task handling, you implement the above scenario using a priority queue.</p>	CO2
5.	<p>You are working on developing an employee management system for a company. The system should be able to store and manage employee information including names, IDs. Demonstrate how a linked list can be applied to manage employee information in a company</p>	CO3
6.	<p>Given a binary tree which has T nodes, you need to find the diameter of that binary tree. The diameter of a tree is the number of nodes on the longest path between two leaves in the tree.</p>	CO4
7.	<p>Implement DFS to detect if a directed graph contains a cycle.</p>	CO5
8.	<p>You are given a sorted array that has been rotated. Implement a function to find a target element in the array. If the target is found, return its index; otherwise, return -1.</p>	CO6
9.	<p>As an educator tasked with assessing students' final projects, it is essential to offer constructive feedback. To facilitate this process, you'll employ the quick sort algorithm to efficiently rank students by sorting their scores in descending order, allowing for a comprehensive evaluation.</p>	CO6
10.	<p>You are organizing a new year's party and you have invited a lot of guests. Now, you want each of the guests to handshake with every other guest to make the party interactive. Your task is to know what will be the minimum</p>	CO6


	time by which every guest meets others. One person can handshake with only one other person at once following the handshake should be 3 seconds sharp. Implement using minimum spanning tree.	
11.	Capstone Project	CO6

Text Books:

1. S. K Srivastava, DeepaliSrivastava , Data Structures through C in Depth , BPB Publications 2011.
2. Yedidya Langsam, MoshejAugenstein, Aaron M. Tenenbaum, Data Structure Using C & C++, Prentice Hall of India 1996.
3. ReemaThareja, Data Structures using C, Oxford.
4. AnanyLevitin, Introduction to the Design and Analysis of Algorithms, Third Edition Pearson Education.

Reference Books:

1. Ellis Horowitz, SartajSahni Fundamentals of Data Structures, Galgotia Publications 2010.
2. Jean Paul Tremblay, Paul G. Sorenson, An introduction to data structures with applications, Tata McGrawHill 1984.
3. Rajesh K. Shukla , Data Structures using C and C++ Wiley India, 2009.
4. Maria Rukadikar ,Data Structure and Algorithm SPD st Edition 2017.
5. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, MIT Press and McGraw-Hill, Fourth edition.

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Course Code	Course Name	Teaching Scheme (Contact Hours 2/week)			Credits Assigned	
		Theory	Practical	Tutorial	Lab	Total
231ITUCL32	Database Management System Lab		2	-	1	1
		Evaluation Scheme				
		Practical / Oral / Practical & Oral				Total
		Term Work		Oral	Practical	
		25		--	25	
					50	

Course Objectives:

1. To explore the basic concepts of databases, including data models, schema design, ER Model and relational algebra.
2. To learn Structured Query Language (SQL) for querying and manipulating data within databases and techniques for designing well-structured databases and applying normalization to optimize data storage.
3. To learn about transaction processing, concurrency control, and recovery management to maintain data integrity.
4. To introduce the fundamentals of PL/SQL and query processing.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Define the problem statement and Construct the conceptual model for real life application.
2. Create and populate a RDBMS using SQL.
3. Formulate and write SQL queries for efficient information retrieval
4. Apply view, triggers and procedures to demonstrate specific event handling.
5. Demonstrate database connectivity using JDBC.
6. Demonstrate the PL-SQL commands.

Prerequisite: C Programming.

Suggested list of experiments:

Expt. No.	Title of Experiment	CO Mapping
1	Identify the real world problem and formulate the problem statement. Create an Entity-Relationship (ER) / Extended Entity-Relationship (EER) Model.	CO1
2	Design the conceptual model for real life application and its mapping with relational model	CO2
3	Create a database using DDL and apply integrity constraints.	CO2
4	Perform data manipulations operations on populated database	CO3
5	Perform Authorization using Grant and Revoke.	CO3
6	Implement Basic queries, join and complex SQL queries	CO4
7	Implementation of Views and Triggers.	CO4
8	Demonstrate database connectivity using JDBC.	CO5
9	Execute TCL commands.	CO5
10	Execution of PL/SQL blocks	CO6
11	Case Study on No SQL Databases(MONGODB)	CO6
12	Capstone Project	CO6

Text Books:

1. Korth, Silberchatz, Sudarshan, Database System Concepts, McGraw Hill, 6th Edition
2. Elmasri and Navathe, Fundamentals of Database Systems, Pearson education, 6th Edition

Reference Books:

1. Peter Rob and Carlos Coronel, Database Systems Design Implementation and Management, Thomson Learning, 9th Edition.
2. P.S. Deshpande, SQL & PL / SQL for Oracle 11g Black Book, Dreamtech Press.
3. G. K. Gupta, Database Management Systems, McGraw – Hill
4. Rob, Coronel, Database Systems, Cengage Learning, Seventh Edition.

Credit structure -Semester-IV


Course Code	Course Category	Course Name	Contact Hours			Credits Assigned			
			TH	PR	T	TH	PR	T	Total
231ITUCC41	Programme Core Course	Operating System	3	-	-	3	-	-	3
231ITUCC42	PCC(Programme Core Course)	Data Communication and Network	3	-	-	3	-	-	3
231ITUMM41	MDM – II (Multidisciplinary Minor)	Computer Organization and Architecture	2	-	-	2	-	-	2
231ENUOE21	OE II (Open Elective) Other than a particular programme	Project Management	2	-	-	2	-	-	2
231ENUOE22		E-commerce and Digital Marketing							
231ENUOE23		Gender, Economy, and Work							
231ENUOE24		Usability Analysis							
231ENUOE25		Stress Management							
231ENUOE31	OE III (Open Elective) Other than a particular programme	Management Information Systems	2	-	-	2	-	-	2
231ENUOE32		Product Lifecycle Management							
231ENUOE33		Emerging Trends in Technology							
231ENUOE34		Cyber and Data Laws							
231ENUOE35		Design Thinking							
231ENUHS41	HSSM (Humanities Social Science and Management)	Financial Management	2	-	-	2	-	-	2
231ENUVE41	VEC (Value Education Course)	Digital Technological solutions	2	-	-	2	-	-	2
231ITUFP41	CEP/FP (Common Engineering Project/ Field Project)	Python based Mini Project-I	-	4	-	-	2	-	2

231ITUCL41	PCC(Programme Core Course) Lab	Operating System Lab	-	2	-	-	1	-	1
231ITUCL42	PCC(Programme Core Course) Lab	Data Communication and Network Lab	-	2	-	-	1	-	1
231ENUAU41	Audit Course	Constitution Of India	1	-	-	-	-	-	-
Total			16	8		16	4		20

Evaluation Scheme: Semester-IV

Course Code	Course Category	Course Name	Internal Assessment				Uni. Exam	IA	Uni. Exam	Total
			IA1	IA2	AVG	MSE	ESE	TW	OR/PR	
231ITUCC41	Programme Core Course	Operating System	20	20	20	20	60	--	--	100
231ITUCC42	PCC(Programme Core Course)	Data Communication and Network	20	20	20	20	60	--	--	100
231ITUMM41	MDM – II (Multidisciplinary Minor)	Computer Organization and Architecture	15	15	15	10	50	--	--	75
231ENUOE21	OE II (Open Elective) Other than a particular programme	Project Management	15	15	15	10	50	--	--	75
231ENUOE22		E-commerce and Digital Marketing								
231ENUOE23		Gender, Economy, and Work								
231ENUOE24		Usability Analysis								
231ENUOE25		Stress Management								
231ENUOE31	OE III (Open Elective) Other than a particular programme	Management Information Systems	15	15	15	10	50	--	--	75
231ENUOE32		Product Lifecycle Management								
231ENUOE33		Emerging Trends in Technology								
231ENUOE34		Cyber and Data Laws								
231ENUOE35		Design Thinking								
231ENUHS41	HSSM (Humanities Social Science and Management)	Financial Management	15	15	15	10	50	--	--	75
231ENUVE41	VEC (Value Education Course)	Digital Technological solutions	15	15	15	10	50	--	--	75
231ITUFP41	CEP/FP (Common Engineering Project/ Field Project)	Python based Mini Project-I	--	--	--	--	--	25	25	50
231ITUCL41	PCC(Programme Core Course) Lab	Operating System Lab (UNIX Lab)	--	--	--	--	--	25	25	50

231ITUCL42	PCC(Programme Core Course) Lab	Data Comm. and Network Lab	--	--	--	--	--	25	25	50
		Total	--	--	115	90	370	75	75	725

 <div>D Y PATIL DEEMED TO BE UNIVERSITY — RAMRAO ADIK — INSTITUTE OF TECHNOLOGY NAVI MUMBAI</div>		B.TECH IN INFORMATION TECHNOLOGY				SECOND YEAR SEM- IV	
Course Code	Course Name	Teaching Scheme (Contact Hours 45)				Credits Assigned	
		Theory	Practical	Tutorial		Theory	Total
231ITUCC41	Operating System	3	-	-		3	3
		Evaluation Scheme					
		Theory					Total
		Internal Assessment				End Sem. Exam	
		IA1	IA2	Avg of 2 IA	Mid Sem Exam		
		20	20	20	20		

Course Objectives: Upon the completion of the course the student will be able to

1. Understand the fundamental concepts, principles, components and architecture of operating systems.
2. Gain practical knowledge of process management, control and synchronization.
3. Comprehend memory management techniques and analyze file systems for storage management.
4. Design real world solutions and investigate security protection mechanisms in operating systems.

Course Outcomes: At the end of the course learner will able to

1. Demonstrate a deep understanding of the core concepts and components of operating systems.
2. Analyze and evaluate different process management and control policies.
3. Analyze the core requirement of interprocess communication and deadlocks
4. Design and implement memory management solutions, including virtual memory.
5. Evaluate file systems and storage management techniques in operating systems
6. Apply the knowledge gained to solve real-world problems related to operating systems and assess security mechanisms for its protection.

Prerequisite: Data Structures and Analysis, Computer Programming

Module No	Contents	Hrs. (45)	CO
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1.	Operating System Fundamentals: Operating System Structure and services, Unix OS architecture and its kernel, Types of Kernels, Systems Calls, types of system.	7	CO1
2.	Process Management and Control: Process Structure: states and transition (five states, seven states and Nine States), process context switching. Process creation and termination. Process Scheduling (Pre-emptive, Non-Preemptive and Real Time). Scheduling: Linux, Windows.	8	CO 2
3.	Inter-process communication and Deadlocks: Inter process communication using Peterson algorithm to solve mutex problem, semaphores using reader writer problem and dining philosopher problem, Deadlock detection, prevention, and avoidance.	8	CO 3
4.	Memory Management: Memory allocation strategies- Static and Dynamic, Contiguous and Non-contiguous, Segmentation, Paging, Virtual memory Management, Kernel Memory Allocation.	7	CO 4
5.	File Systems and Storage: node Structure, Structure of regular file, conversion of path name to an inode, node assignment to new file, disk storage and allocation of disk block.	7	CO 5
6.	Case Studies and Advanced Topics: Analysis of Linux and Windows kernel, File system of Windows and Linux, Protection of Files, Security models, access control, and OS protection.	8	CO 6

Text Books:

1. Maurice J. Bach, The Design of the UNIX® Operating System, Pearson Publication.
2. Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, Operating System Concepts, Ninth Edition, Wiley Publication.

Reference Books:

1. Andrew S. Tanenbaum, Modern Operating Systems, Ninth Edition, Pearson Education.
2. William Stallings, Operating Systems: Internals and Design Principles, Eighth Edition, Pearson Education,
3. Ramaz Elmasri, A. Gil Carrick, David Levine, Operating Systems – A Spiral Approach, Tata McGraw Hill Edition
4. AchyutS. Godbole, AtulKahate, Operating Systems , Third Edition, McGraw Hill Education.

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Course Code	Course Name	Teaching Scheme (Contact Hours 45)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ITUCC42	Data Communication and Computer Network	3	-	-	3	3	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		20	20	20	20	60	100

Course Objectives:

1. Understand the TCP/IP and OSI protocol suite's architecture and principles.
2. Analyze the behavior and functionality of OSI protocol stack.
3. Design and implement networked systems using OSI protocol stack.
4. Apply networking principles to solve real-world networking problems.

Course Outcomes: At the end of the course learner will able to

1. Explain the architecture and principles of the TCP/IP protocol suite.
2. Analyze the behavior and functionality of the Data link layer for wired networks.
3. Design and implement networked systems based on network layer features.
4. Collaborate effectively in network design and analysis in the transport layer.
5. Analyze features and use of Application layer protocols.
6. Apply networking knowledge to solve practical networking challenges.

Prerequisite:

1. Basic understanding of computers.
2. Basic Internet search skills.
3. Basic knowledge of computer networking.

Module No	Contents	Hrs. (45)	CO
1.	Networking Today: Networking fundamentals, OSI and TCP/IP models, Network Concepts: Network Representations and Topologies, peer to peer	7	CO1


	communication, Common Types of Networks, Reliable Networks: Network Architecture, Fault Tolerance, Scalability, Security. Physical Layer: Components: Signaling and cabling in data transmission, Data Access: Encapsulation and Decapsulation.		
2.	Data Link Layer: Introduction, Data link Control: Flow control and framing, Error detection and correction, Multi-Access Protocol: Random, Control and Channelization, medium access control protocol, Link layer addressing and standards, Address resolution protocol(ARP), RARP.	7	CO2
3.	Network Layer: Introduction, Network layer services, packet switching and performance, Datagram Format:IPv4, Protocols: IPv4 Subnetting and addressing, Routing algorithms: Distance Vector, Link state, RIP, BGP, OSPF, eBGP, New generation IP: IPv6 subnetting and addressing, ICMPv4 and ICMPv6.	8	CO3
4.	Transport Layer: Introduction, Port Addressing, Transport layer protocol: Stop-N-Wait, Go-back-N, Selective repeat, Piggybacking. UDP datagram protocol: Header, Application and services TCP Segment: Header, State transition diagram, flow control, error control and congestion control.	8	CO4
5.	Application layer: Introduction: Application of Programming Interface, Compression techniques: Lossy and lossless, Standard client-server application- HTTP, FTP, SMTP, DNS, DHCP, TELNET, SSH.	8	CO5
6.	Network Design and Management: Network design and optimization, SNMP protocol, Quality of Service (QoS), Troubleshooting techniques: Information Gathering, Analysis and Planning, Implementation of a solution, Assessment of the effectiveness of the solutions.	7	CO6

Text Books:

1. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, 2018, 6th Edition.
2. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, McGraw Hill, 2022, Standard Edition.

Reference Books:

1. Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, 2010, Pearson, 5th Edition.
2. W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, Pearson Education India, 2011, 2nd Edition .
3. Steve McQuerry, CCNA self Studying, Cisco Press, 2003, 2nd Edition.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ITUMM41	Computer Organization and Architecture	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10		50

Course Objectives:

1. Learn the fundamentals of Digital Logic Design.
2. Conceptualize the structure, function, and characteristics of computer systems.
3. Analyse various algorithms used for arithmetic operations.
4. Study processor organization, function of each element of the memory hierarchy in digital computers and compare different methods for computer I/O

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Demonstrate the fundamentals of Digital Logic Design
2. Understand the different computer architectures such as RISC, CISC, Von Neumann Architecture, Harvard architecture
3. Apply computer arithmetic operations on integers and real numbers.
4. Demonstrate control unit approaches like hardwired control unit and microprogrammed control unit.
5. Analyze and compare mapping techniques of cache memory.
6. Compare different methods of data transfer techniques such as programmed I/O, Interrupt I/O, DMA

Prerequisite: Basics of Electrical Engineering, Fundamentals of Computer


Module No	Contents	Hrs. (30)	CO
1	Fundamentals of Logic Design: Introduction to Number systems, Binary Number systems, Signed Binary Numbers, Binary, Octal, Decimal and Hexadecimal number and their conversions, 1's and 2's complement Combinational Circuits: NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR Gates. Half & Full Adder and Subtractor, Introduction to Multiplexers and Demultiplexers, Encoders & Decoders, Flip Flops.	6	CO1
2.	Fundamentals of Computer Organization and Architecture: History and Generation of Computer, Functional Units of Computer, Basic Operational Concepts of Computer, Top level Structure and Function, Performance of Computer, Von Neumann Architecture- Expanded structure of IAS Computer, Harvard Architecture, RISC, CISC Architecture	4	CO2
3.	Computer Arithmetic: Multiplication: Add and shift, Booth Algorithm, Division: Restoring and Non-restoring Techniques. Floating Point Arithmetic: Floating point representation IEEE 754 (Single & double precision)	4	CO3
4.	Processor Organization: Central Processing Unit: Processor Organization, Internal Structure of CPU, General register organization, Instruction Format, Instruction Cycle, Addressing Modes, Control Unit: Soft wired (Micro-programmed) and hardwired control unit, design methods. Micro operations: Register transfer language (RTL),	6	CO4
5.	Memory Organization: Main memory, RAM, ROM and secondary memory, Memory Parameters, Memory hierarchy, Cache Memory- Cache Design, Concept, architecture (L1, L2, L3), Locality of reference, Mapping Techniques, Cache Coherency, Associative and Interleaved Memory	6	CO5
6.	I/O Organization: Input/output systems, I/O module-need & functions and Types of data transfer techniques: Programmed I/O, Interrupt driven I/O and DMA	4	CO6

Text Books:

1. R. P. Jain, Modern Digital Electronics, McGraw-Hill, July 2022, 5th Edition
2. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson, 2009 Eighth Edition
3. John P. Hayes, Computer Architecture and Organization, McGraw-Hill, July 2017, Third Edition

Reference Books:

1. Anand Kumar, Fundamentals of Digital Circuits, PHI, 2016 , 4th edition
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, Tata McGraw-Hill, 2011, Fifth Edition,
3. Govinda rajulu,, Computer Architecture and Organization: Design Principles and Applications, Tata McGraw-Hill 1st July 2017, 2nd edition.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE21	Project Managem nt	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10	50	75

Course Objectives:

1. To familiarize the students with the use of a Project Management techniques and tools used in various industry sectors for achieving success in projects.
2. To understand and be able to apply processes and techniques throughout the life cycle of a project from initiation to closure.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand what projects are and what the importance of management and the project manager is.
2. Analyse and initiate projects based on numeric and non-numeric criteria. Design a project proposal and build project teams.
3. Analyze the effect of different organizational structures on the execution of projects. Perform Project estimation and budgeting. Understand role of project management office.

4. Perform project planning activities including risk planning, scheduling, team building and resource allocation.
5. Perform project control activities like monitoring & control, auditing, reporting, tracking, risk mitigation & control.
6. Perform proper closure of different types of projects. Apply the techniques learned in the course in the execution of real-life projects.

Module No	Contents	Hrs. (30)	CO
1	Project Management Fundamentals: Definition of a project, Necessity of project management, Triple constraints, Project life cycles, Project phases, Qualities of project manager, Role of project manager. Leadership and Ethics, Project management in various organization structures.	05	CO1
2	Project Initiation: How to get a project started? Selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter; Project proposal. Effective project team, Stages of team development & growth, Conflicts and Negotiations.	05	CO2
3	Project Budgeting and Estimation: Project Plan, Work Breakdown structure (WBS) and linear responsibility chart, Interface Co-ordination, Project cost estimation and budgeting, Top down and bottoms up budgeting. Work element costing	05	CO3
4	Project Planning and Management: Project Scheduling, GANTT Chart, Networking and Scheduling techniques. PERT and CPM. Crashing project time, Resource loading and leveling, Goldratt's critical chain, Project Stakeholders and Communication plan. Risk Management in projects: Risk management planning, Risk identification and risk register. Qualitative and quantitative risk assessment, Project procurement management. Change Management	05	CO4


5	Project Monitoring and Control: Planning monitoring and controlling cycle. Information needs and reporting, engaging with all stakeholders of the projects. Team management, communication and project meetings. Earned Value management techniques for measuring value of work completed. Using milestones for measurement change requests and scope creep. Project audits.	05	CO5
6	Project Closure: Customer acceptance. Reasons of project termination, Various types of project terminations, Process of project termination. Completing a final report, doing a lesson learned analysis, acknowledging successes and failures. Project management templates and other resources. Case studies of successful and failed projects.	05	CO6

Text Books:

1. Jack Meredith & Samuel Mantel, Project Management: A managerial approach, Wiley India, 10th Ed.
2. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 6th ed., Project Management Institute PA, USA.

Reference Books:

1. Harold Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 12th Ed, Wiley.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE22	E- Commerce and Digital Marketing	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10	50	75

Course Objectives:

1. This course is focused on understanding e-commerce and its evolution. It is also one of the foremost marketing medium.
2. Consumer behaviour, marketing challenges, etc have been discussed.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand the evolution of digital marketing
2. Learn different marketing models
3. Develop an understanding of consumer behaviour
4. Assess and plan marketing strategies
5. Understand the challenges in digital marketing
6. Apply modern techniques in digital marketing

Module No	Contents	Hrs · (30)	CO
1	Introduction: Evolution of Digital marketing, Internet marketing, Digital Marketing Frame work	04	CO 1


2	Factors impacting digital market place: from market spaces to market places, value chain digitization, marketing business models, application of digital marketing models.	04	CO 2
3	Consumers for Digital market: evolution of consumer behaviour models, managing consumer demand, Integrated marketing communication (IMC), Impact of Digital channels on IMC.	06	CO 3
4	Market Assessment Phase: Element of assessment phase, Digital marketing (DM) and Internal assessment, DM and objectives planning, DM strategy definition, DM operation set- up, Campaign management.	08	CO 4
5	Market Execution challenges: Managing Digital Market Revenues, service delivery and payment, digital implementation challenges.	04	CO 5
6	Digital marketing – The Global Landscape, The Indian view, Emerging trends and concepts- Big Data and IOT, B2B and SMB, Career in Digital Marketing	04	CO 6

Text Books:

1. Sushil Bhardwaj, E-Commerce And Digital Marketing, Kalyani Publishers, 2019.
2. Rajan Gupta, Supriya Madan, Digital Marketing: The Science and Magic of Digital Marketing Can Help You Become a Successful Marketing Professional, BPB Publisher, 2023.
3. Dave Chaffey, Fiona Ellis-Chadwick, Digital Marketing, Pearson, 2022.

Reference Books:

1. Stephanie Diamond, Digital Marketing All-In-One for Dummies, 2023.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE23	Gender, Economy and Work	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10	50	75

Course Objectives:

1. This course discusses the issues of gender equality and government measures ensuring gender equality at workplaces.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Learn basic concepts of gender equity and social economics
2. Understand Economic growth with a global perspective.
3. Understand the need of gender equity at workplace and household economics
4. Analyze gender analytics frameworks.
5. Learn Principles of gender budgeting in India.
6. Gain knowledge about the government initiatives and policies to ensure gender equity.

Module No	Contents	Hrs · (30)	CO
1	Introduction to Gender Studies: Basic Concepts - Difference between Gender and Sex - Concept of Gender Economics - Gender Concerns in Economic Theory - Sen's Contribution - Gender Division of Work - Invisibility of Women's Work - Gender Mainstreaming - Gender Statistics and 5 System of Sources of Data on the	5	CO1

	Population - Gender Inequality Factors - Development Factors - Discrimination and Behavioural Factors - Gender Gap in Access to Resources and Control Over Economic Resources.		
2	Economic Growth and Gender Equality Globalization of the World Economy and Gender Status - Impact of Economic Growth on Gender Equality - Gender Equality and Economic Growth and Socio-Economic Development. Impact of Globalization on Gender Status - Concept of the “Feminization of Poverty” - Basic Causes - Problems of Measuring the Feminization of Poverty - Gender Differences in Incomes - Women’s Contribution to GDP - Estimation of Women’s Unpaid Work.	5	CO2
3	Gender Equity in Household Economics Distribution of Resources and Decision-Making Mechanisms Within the Household - Theoretical Concepts - Work in the Labour Market - Work in the Household - Model of Investment in Human Capital - Marital and Age-Dependent Models of Female and Male Employment -Meaning of Gender Equity and Equality - Gender Equity Index - Gender Inequality Index of UNDP - Gender Status Index - Gender in Human Development - Gender Development Index - Gender Empowerment Measure - Gender in Social Development Indicators - the OECD Social Institutions and Gender Index (SIGI).	5	CO3
4	Gender Analysis Frameworks and Gender Budgets Gender Analysis: Harvard Analytical Framework/Gender Roles Framework - Gender Planning Framework: (Caroline Moser) - Gender Analysis Matrix (Rani Parker) - Women Empowerment Framework (Sara HlufekileLongwe) - Social Relations Framework: (NailaKabeer) - Integrated Gender Analysis	5	CO4
5	Gender Budgeting - Methodology of Gender Budget Preparation - Approaches and Principles of Gender Budgeting - Gender Budgeting in India and Karnataka.	5	CO5
6	Gender Development and Mainstreaming Initiatives:	5	CO6


	<p>Review of Gender Development and Empowerment Policies - Gender Inclusive Planning - Gender Sensitization of institutions and policies - Mainstreaming Gender into Development Policies - Role of Institutions in Gender Mainstreaming - Rights Based Approach to Gender Development - Democratic Decentralization (Panchayats) and Women's Empowerment in India.</p>		
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Text Books:

1. Agarwal, B., Bargaining and Gender Relations: Within and Beyond the Household, Feminist Economics, Spring, pp. 1-25D.
2. Batliwala, S., The Empowerment of Women in South Asia: Concepts and Practices, Sage, New Delhi.
3. Boserup, Ester., Women's Role in Economic Development, New York, St Martin's Press.
4. Bowles Gloria and Dueli Klein Kenate, Theories of Women Studies, New York.

Reference Books:

1. Agnihotri, S.B. (2000): Sex ratio in Indian Population: A Fresh Exploration, Sage Publications, and Delhi.
2. Baud, I.S. A.(1992): Forms of Production and Women's Labour : Gender Aspects of Empowerment in South Asia, Vistaar Publications, New Delhi.
3. Boserup, E (1970): Women's Role in Economic Development, George Allen and Unwin, London.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE2 4	Usability Analysis	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15			10

Course Objectives:

1. To understand the human centered design process and usability engineering process and their roles in system design and development.
2. To know usability design guidelines, their foundations, assumptions, advantages, and weaknesses.
3. Understand the user interface based on analysis of human needs and prepare a prototype system.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Describe the human centered design process and usability engineering process.
2. Learn the role of usability in system design and development.
3. Discuss usability design guidelines, their foundations, assumptions, advantages, and weaknesses.
4. Design a user interface based on analysis of human needs and prepare a prototype system.
5. Assess user interfaces using different usability engineering techniques.
6. Present the design decisions


Module No	Contents	Hrs · (30)	CO
1	Introduction to Usability in engineering. Usability and Other Considerations, Definition of Usability.	5	CO 1
2	Measuring the Usability of Icons, Usability Trade-Offs, Categories of Users and Individual User Differences	5	CO 2
3	Usability in Software Development : The Emergence of Usability, Human Computer Interaction, Usability Engineering	5	CO 3
4	The usability Engineering Lifecycle: Requirement Analysis, Design, Testing, Development	5	CO 4
5	Usability Assessment Methods beyond Testing	5	CO 5
6	International User Interfaces	5	CO 6

Text Books:

1. Mary Beth Rosson, John Millar Carroll, Usability Engineering: Scenario- based Development of Human- Computer Interaction
2. Jakob Nielsen, Usability Engineering

Reference Books:

1. Deborah J. Mayhew, The usability engineering lifecycle

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE25	Stress Management	2	-	-	2	2	
		Evaluation Scheme					
		Theory				End Sem. Exam	Total
		Internal Assessment					
		IA1	IA2	Avg of 2 IA	Mid Sem Exam		
		15	15	15	10	50	75

Course Objectives:

1. Learn about stress its mechanisms and types.
2. Learn to manage and mitigate stress to improve quality of life.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand the basic principles of stress management.
2. Recognize your stress triggers on the body.
3. Understand sources of stress.
4. Use coping tips for managing stress both on and off the job.
5. To understand stress management techniques.
6. Learn to manage stress through diet, sleep and other lifestyle factors


Module No	Contents	Hrs - (30)	CO
1	Understanding the Nature of Stress: The Meaning of Stress, History of Stress Research, Responses to Stress, Types of Stress, Sources of Stress, Self-Assessment of Stress	04	CO 1
2	The Body's Reactions to Stress: The Battle Within Nervous System, Initiation and Control of the Stress Response, The Brain and Stress, The Autonomic Nervous System and Stress, The Endocrine System, The Immune System, Immunity and Stress, The Cardiovascular System, The Gastrointestinal System, The Musculoskeletal and Skin Systems, The Reproductive System.	04	CO 2
3	Sources of Stress across the Lifespan: Developmental Tasks, Developmental Stages and Major Stressors, Transactional Model of Stress, Stress in Childhood, Prenatal and Infant Stress, Stress in Elementary-School-Age Children, How Children Cope with Stress, Stress in Adolescence, Peer Relationships, Academics and School, Unusual Stressors, How Teenagers Cope with Stressors, Stress in Young Adulthood, Friendships and Tribal Affiliations, Selecting a Life Partner, College and Stress, When Stress Leads to Suicide, Sex, Drugs, Rock and Roll, Career Selection and Stress.	08	CO 3
4	Adaptive and Maladaptive Behaviour: Theoretical Models of Coping and Adaptation, Psychoanalytic Model, Humanistic Model, Behavioural Model, Cognitive Model, Emotional Responses to Stress, Fears and Phobias, Anxiety and Panic Disorder Individual and Cultural Differences: Personality and Stress, States versus Traits, Gender and Stress, Culture and stress	06	CO 4
5	Strategies of Stress Management and Prevention : Challenging Stressful Thinking: Cognitive Theory in a Nutshell, Disputing the Irrational Belief, The Power of Language, Ceasing Disturbing Thoughts	04	CO 5
6	Problem Solving and Time Management : Time Management and Stress, Differences between Concern and Worry, and Why it Matter, Strategies for Time Management,	04	CO 6

Text Books:

1. Stress Management and Prevention: Applications to Daily Life - Kottler, Jeffrey A
2. Archer, James, Jr. Managing Anxiety and Stress. Second Edition.

Reference Books:

1. Robert Schachter, Mindfulness for Stress Management: 50 Ways to Improve Your Mood and Cultivate Calmness, 2019.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theory	Total
231ENUOE31	Managem ent Informati on Systems	2	-	-	2	2
		Evaluation Scheme				
		Theory				Total
		Internal Assessment			End Sem · Exam	
		IA1	IA 2	Avg of 2 IA		
		15	15	15	10	

Course Objectives:

1. The course is blend of Management and Technical field.
2. Discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built
3. Define and analyze typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage
4. Identify the basic steps in systems development

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Explain how information systems Transform Business
2. Identify the impact information systems have on an organization
3. Describe IT infrastructure and its components and its current trends

4. Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
5. Identify the types of systems used for enterprise-wide knowledge management
6. Learn to provide value to business.


Module No	Contents	Hrs (30)	CO
1	Introduction To Information Systems (IS) Computer Based Information Systems, Impact of IT on organizations, Importance of IS to Society. Organizational Strategy, Competitive Advantages and IS.	5	CO1
2	Data and Knowledge Management Database Approach, Big Data, Data warehouse and Data Marts, Knowledge Management Business intelligence (BI): Managers and Decision Making, BI for Data analysis and Presenting Results	5	CO 2
3	Ethical issues and Privacy Information Security. Threat to IS, and Security Controls	5	CO3
4	Social Computing (SC) Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C. Mobile commerce.	5	CO4
5	Computer Networks Wired and Wireless technology, Pervasive computing, Cloud computing model.	5	CO5
6	Information System within Organization Transaction Processing Systems, Functional Area Information System, ERP and ERP support of Business Process. Acquiring Information Systems and Applications: Various System development life cycle models.	5	CO6

Text Books:

1. Kelly Rainer, Brad Prince, Management Information Systems, Wiley
2. K. C. Laudon and J.P. Laudon, Management Information Systems: Managing the Digital Firm, 10th Ed., Prentice Hall, 2007.

Reference Books:

1. D. Boddy, A. Boonstra, Managing Information Systems: Strategy and Organization, Prentice Hall, 2008.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUOE32	Product Lifecycle Management	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15			10

Course Objectives:

1. To familiarize the students with the need, benefits and components of PLM.
2. To acquaint students with Product Data Management & PLM strategies.
3. To give insights into new product development program and guidelines for designing and developing a product.
4. To familiarize the students with Virtual Product Development.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Gain knowledge about phases of PLM, PLM strategies and methodology for PLM Feasibility study and PDM implementation.
2. Illustrate various approaches and techniques for designing and developing products.
3. Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc.
4. Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plan.
5. Integration of environmental aspects in product design.
6. Carry out Life Cycle Assessment and Life Cycle Cost Analysis.

Module No	Contents	Hrs. (30)	CO
1	<p>Introduction to Product Lifecycle Management PLM):</p> <p>Product Lifecycle Management(PLM , Need for PLM, Product</p> <p>Lifecycle Phases, Opportunities of Globalization, Pre PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM</p> <p>Project, Starting the PLM Initiative, PLM Applications.</p> <p>PLM Strategies :Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy, Change management for PLM</p>	06	CO1
2	<p>Product Design Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase, Methodological Evolution in Product Design, Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering and Life Cycle Approach, New Product</p> <p>Development (NPD)and Strategies, Product Configuration and Variant Management, The Design for X System, Objective</p>	06	CO2


	Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process		
3	Product Data Management (PDM): Product and Product Data, DM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation.	04	CO3
4	Virtual Product Development Tools: For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock up, Model building, Model analysis, Modeling and simulations in Product Design, Examples/Case studies.	05	CO4
5	Integration of Environmental Aspects in Product Design Sustainable Development, Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design	04	CO5
6	Life Cycle Assessment and Life Cycle Cost Analysis Properties, and Framework of Life Cycle Assessment, Phases of LCA in ISO Standards, Fields of Application and Limitations of Life Cycle Assessment, Cost Analysis and the Life Cycle Approach, General Framework for LCCA, Evolution of Models for Product Life Cycle Cost Analysis.	05	CO6

Text Books:

1. John Stark, "Product Lifecycle Management: Paradigm for 21st Century Product Realisation", Springer-Verlag, 2004. ISBN: 1852338105.
2. Fabio Giudice, Guido La Rosa, Antonino Risitano, "Product Design for the environment-A life cycle approach", Taylor & Francis 2006, ISBN: 0849327229.

Reference Books:

1. SaaksvuoriAntti, ImmonenAnselmie, “Product Life Cycle Management”, Springer, Dreamtech, ISBN: 3540257314.
2. Michael Grieve, “Product Lifecycle Management: Driving the next generation of lean thinking”, Tata McGraw Hill, 2006.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theory	Total
231ENUOE33	Emerging Trends in Technology	2	-	-	2	2
		Evaluation Scheme				
		Theory				Total
		Internal Assessment			End Sem. Exam	
		IA1	IA2	Avg of 2 IA		
		15	15	15	10	

Course Objectives:

1. Learn the latest technological advancements in education as more online and virtual classroom teaching is gaining popularity.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Define educational technology's role in supporting the virtual environment.
2. Identify and evaluate existing and emerging technologies for virtual course instruction or curriculum development.
3. Use collaborative learning tools to design and assess learning activities.
4. Use game-based strategies to deepen student engagement in virtual courses.
5. Research, evaluate, and employ open content in virtual education.
6. Debate the role of MOOCs in virtual education.

Module No	Contents	Hrs . (30)	CO
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1	The Role of Educational Technology in Virtual Education: The role of technology in virtual education, evaluate technologies for use, and how to implement technology in the virtual classroom. Problems related to virtual trends and technology.	6	CO1
2	Collaborative Technologies in Virtual Education: Collaborative learning technologies and evaluate learning management systems. Review of asynchronous and synchronous technologies for application virtual education.	6	CO 2
3	Game-based Learning Vs Gamification, examples of digital game based learning, DGBL platforms such as prodigy.	5	CO 3
4	Augmented reality, and wearable technologies: In-depth learning framework, lesson design maps, learning experience model to implement VR lessons.	5	CO 4
5	Open Content in Virtual Education: compare different types of open educational content.	4	CO 5
6	Exploring the Benefits and limitations of virtual learning. Learning life skills through gaming for children with autism disorder.	4	CO 6

Text Books:

1. Chris Bailey, Digital Education and Learning, Palgrave Macmillan, 2021.
2. Brooke B. Eisenbach, Paula Greathouse, The Online Classroom: Resources for Effective Middle Level Virtual Education, Information Age Publishing, 2018

Reference Books:

1. Yiyu Cai (editor), Wouter van Joolingen (editor), Koen Veermans (editor), Virtual and Augmented Reality, Simulation and Serious Games for Education (Gaming Media and Social Effects), Springer 2021.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theoy	Total
231ENUOE34	Cyber and Data Laws	2	-	-	2	2
		Evaluation Scheme				
		Theory				Total
		Internal Assessment			End Sem. Exam	
		IA1	IA2	Avg of 2 IA		
		15	15	15	10	

Course Objectives:

1. To understand and identify different types cybercrime and cyber law
2. To recognized Indian IT Act 2008 and its latest amendments
3. To learn various types of security standards compliances

Course Outcomes: On successful completion of course, learner/student will be able to

1. Understand the concept of cybercrime and its effect on outside world
2. Interpret and apply IT law in various legal issues
3. Apply various tools used for cyber-crime for investigation
4. Distinguish different aspects of cyber law & its compliance
5. Apply and analysed IT Acts for current cyber crimes
6. Apply Information Security Standards compliance during software design and development.

Module No	Contents	Hrs . (30)	CO
1	Introduction to Cybercrime: Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime, Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes.	5	CO 1


2	Cyber offenses & Cybercrime Social egg attacks, Cyber stalking, Botnets, Attack vector, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges for wireless Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops	5	CO 2
3	Tools for Cyberline Methods, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Steganography, Covert channels, storage and timing covert channels, counter measures for covert communication, DoS and DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Identity Theft -ID Theft	5	CO 3
4	The Law of ITCompliance How to conduct investigations: Cooperation with investigations, Numerous Examples of Fraud (PostMordems), Securities Fraud, Federal Sentencing Guidelines, Codes of Ethics, Hotlines, Reporting, Whistleblowing, Employee Monitoring, Entrapment, Raids & Seizures Electronic Banking , The Need for an Indian Cyber Law.	5	CO 4
5	Indian IT Act Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments	5	CO 5
6	Information Security Standard compliances, Information Security Standard compliances SOX, GLBA, HIPAA, ISO, FISMA, NERC, PCI.	5	CO 6

Text Books:

1. Sood, Cyber Laws Simplified, McGraw Hill.
2. Anthony Reyes, "Cyber Crime Investigations: Bridging the Gaps between Security Professionals, Law Enforcement, and Prosecutors", Syngress Publishing, 2007.
3. Nina Godbole, SunitBelapure, "Cyber Security", Wiley India, New Delhi.

Reference Books:

1. Suresh T. Vishwanathan, "The Indian Cyber Law", Bharat Law House, New Delhi.
2. Bare Act, "The Information technology Act, 2000", Professional Book Publishers, New Delhi.
3. Prashant Mali, "Cyber Law & Cyber Crimes", Snow White Publications, Mumbai.
4. Nina Godbole, "Information Systems Security", Wiley India, New Delhi.
5. Kenneth J. Knapp, "Cyber Security & Global Information Assurance", Information Science Publishing.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theory	Total
231ENUOE35	Design Thinking	2	-	-	2	2
		Evaluation Scheme				
		Theory				Total
		Internal Assessment			End Sem. Exam	
		IA 1	IA 2	Avg of 2 IA		
		15	15	15	10	50

Course Objectives:

1. Recognize the importance of DT
2. Explain the phases in the DT process
3. List the steps required to complete each phase in DT process
4. Apply each phase in the DT process
5. Use doodling and storytelling in presenting ideas and prototypes
6. Create value proposition statements as part of their presentations
7. Recognize how DT can help in functional work
8. Recognize how Agile and DT complement each other to deliver customer satisfaction

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Recognize the importance of Design Thinking and identify the steps required to conduct an immersion activity.
2. Create personas in the define phase of DT.
3. Recognize the steps to create problem statements in the define phase of design thinking.
4. Apply the steps in the ideate phase of DT.
5. Create a prototype and recognize the importance of service value proposition.
6. Test a prototype created through a DT process.

Module No	Contents	Hrs. (30)	CO
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1	Introduction: Recognize the importance of Design Thinking why is Design Thinking important for business? Why is Design Thinking important for you? , Identify the steps in the DT process What is DT? Empathize (search for rich stories and find some love), Define (user need and insights – their POV), Ideate (ideas, ideas, ideas), Prototype (build to learn), Test (show, don't tell)	5	CO1
2	Empathy Phase: Recognize the steps in the empathize phase of DT; What is empathy? Ask What? How? Why? Different types to developing Empathy towards People Identify the steps required to conduct an immersion activity. How to empathize? Intro to Immersion Activity; Conduct an immersion activity and fill up the DT question template, Immersion activity.	5	CO2
3	Define Phase: Creating personas: Recognize the steps to create personas in the define phase of DT. What is a persona and how do I create one? Four Different Perspectives on Personas 1) Goal-directed Personas 2) Role-Based Personas 3) Engaging Personas 4) Fictional Personas, 10 steps to Creating Your Engaging Personas and Scenarios Recognize the steps to create problem statements in the define phase of DT, Problem statements, defining problem statements, Define the problem statements in the define phase of DT.	5	CO3
4	Ideate Phase: How to Ideate? Recognize the steps in the ideate phase of DT, Apply the steps in the ideate phase of DT, Ideation games: Game 1: Six Thinking Hats, Game 2: Million-dollar idea, Ideate to find solutions, Characteristics Required for Successful Ideation, Recognize how doodling can help to express ideas, Recognize the importance of storytelling in presenting ideas and prototypes, What is Storytelling in DT?	5	CO4
5	Prototype phase: Recognize the importance of the prototype phase in DT, Prototype your idea, Create a prototype: Types of Prototyping 1) Low-Fidelity Prototyping 2) High-Fidelity Prototyping, Guidelines for Prototyping, Recognize the importance of service value proposition, Create a value proposition statement.	5	CO5
6	Testing Phase: Testing in Design Thinking, Test the Prototype, Role of DT in your work, discuss How DT can help me to become a better coder? Agile and DT complement each other to deliver customer satisfaction, Share your Story.	5	CO6

Text Books:

1. Hooked by NirEyal
2. The Art of Creative Thinking by Rod Judkins
3. Start Up nation by Dan Senor Saul singer
4. Start with Why by Simon Sinek

Reference Books:

1. What is Design Thinking? Interaction Design Foundation
2. What are some of the good examples of design thinking? – Quora
3. Design thinking 101: Principles, Tools & Examples to transform your creative process
4. Understanding Design thinking WF NEN
5. Design Thinking and Innovation at Apple Wei Li
6. Stanford Webinar- Design Thinking = Method, Not Magic
7. Stanford Design Thinking Virtual Crash Course
8. So Many Uses- activity to spark creativity and design

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned	
		Theory	Practical	Tutorial	Theory	Total
231ENUHS41	Financial Management	2	-	-	2	2
		Evaluation Scheme				
		Theory				Total
		Internal Assessment				End Sem. Exam
		IA1	IA2	Avg of 2 IA	Mid Sem Exam	
		15	15	15	10	75

Course Objectives:

1. To understand the operational nuances of Indian financial system, instruments and market.
2. To study concepts of value of money, returns and risks, corporate finance, working capital and its management.
3. To study technique of making decisions related to finance function.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Understand Indian finance system and corporate finance.
2. Understand Present and future value of money.
3. Evaluate Risk and return on investment.
4. Under the importance of working capital and portfolios.
5. Possess the techniques of managing finance in an organization.
6. Take investment, finance as well as dividend decisions.

Module No.	Contents	Hrs. (30)	CO
1	The Financial Systems: Functions of the Financial System, Financial Assets, Financial Markets, Financial Intermediaries, History and evolution of the Indian Financial System.	05	CO 1


2	<p>Time value of Money: Concept of Time value of Money, Future Value of a Single Amount, Present Value of a Single Amount, Future Value of an Annuity, Present Value of an Annuity, Present Value of a Perpetuity, Intra-Year Compounding and Discounting.</p> <p>Balance Sheets: Financial statements and balance Sheets, Profit and Loss Account, and Cash Flow Statement.</p>	05	CO 2
3	<p>Ratio Analysis: Purpose of Financial Ratio Analysis; Liquidity Ratios; Efficiency or Activity Ratios; Profitability Ratios; Capital Structure Ratios; Stock Market Ratios; Limitations of Ratio Analysis.</p> <p>Risk and Return: Historical Returns and Risk, Expected Return and Risk of a Single Security and a Two-security Portfolio, Risk and Return of a Single Security and a Two-security Portfolio.</p>	05	CO 3
4	<p>Techniques of Capital Budgeting: Capital Budgeting Process, Project Classification, Investment Criteria, Net Present Value, Benefit-Cost Ratio, Internal Rate of Return, Modified Internal Rate of Returns (MIRR), Payback Period, Accounting Rate of Return, Investment Appraisal in Practice.</p> <p>Concepts of Meaning Working Capital; Importance and Factors Affecting an Entity's Working Capital Needs; Management of Inventories; Management of Receivables; and Management of Cash and Marketable Securities.</p>	05	CO 4
5	<p>The Cost of Capital: Cost of Debt and Preference, Cost of Equity, Determining the Proportions, Weighted Average Cost of Capital, Weighted Marginal Cost of Capital, Determining the Optimal Capital Budget, Divisional and Project Cost of Capital, Floatation Cost and the Cost of Capital, Factors Affecting the Weighed Average Cost of Capital</p>	05	CO 5
6	<p>Capital Structure and Firm Value: Assumptions and Definitions, Net Income Approach, Net Operating Income Approach, Traditional Position, Modigliani and Miller Position, Taxation and Capital Structure, Trade off Theory, Signaling Theory, Dividend Policy and Firm Value, Miller and Modigliani Position.</p>	05	CO 6

Text Books:

1. Financial Management Theory & Practice by Prasanna Chandra, Publisher: TMH, New Delhi 2004
2. Fundamentals of Financial Management, 13th Edition (2015) by Eugene F. Brigham and Joel F. Houston; Publisher: Cengage Publications, New Delhi.
3. Fundamentals of Financial Management by Van Horne, Publisher: Prentice Hall of India.
4. Financial Management, 11th Edition (2015) by I. M. Pandey; Publisher: S. Chand (G/L) & Company Limited, New Delhi.

Reference Books:

1. Indian Financial System, 9th Edition (2015) by M. Y. Khan; Publisher: McGraw Hill Education, New Delhi.
2. Advanced Accounting by Gupta R.L. and RadhaSwamy M., Publisher: Sultan Chand & Sons, New Delhi.

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Course Code	Course Name	Teaching Scheme (Contact Hours 30)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUVE41	Digital Technological Solutions	2	-	-	2	2	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA2	Avg of 2 IA			Mid Sem Exam
		15	15	15	10		50

Course Objectives:

1. To gain familiarity with digital paradigms
2. To sensitize about role & significance of digital technology
3. To bring awareness about the e-governance and Digital India initiatives
4. To provide the ability to design and develop digital visualisation platforms

Course Outcome:

On successful completion of course learner/student will be able to:


1. Acquire the knowledge about digital paradigm.
2. Construct systems engineering based process mapping methods to evaluate business requirements for digital transformation.
3. Justify the use of simulation models to address significant decisional needs in business management.
4. Recognize the e-governance and Digital India initiatives
5. Design the digital twin architecture justified by suitable requirements and organisational benefits.
6. Evaluate human-computer interaction methods and their relevance to visualisation

Module No	Contents	Hrs. (30)	CO
1.	Introduction & Evolution of Digital Systems. Role & Significance of Digital Technology. Information & Communication Technology & Tools. Computer System & it's working, Software and its types. Operating Systems: Types and Functions. Problem Solving: Algorithms and Flowcharts.	4	CO1

2.	Digital Business & Enterprise Systems Introduction to design thinking (lean/agile) for digital technologies adoption, Fundamentals of process mapping, and business capability modelling, Assessing project management methodologies & governance models on digital transformation, Develop and build a Digital Business Ecosystem architecture to enable interoperability, Evaluating the impact of technologies in the context of: Paths and pathway for successful implementation, Social & cultural impact on digital disruption & transformation Human factors.	6	CO2
3.	Integrated Data Management Introduction to modelling including overview of simulation methods and techniques. Simulation design and development, Root cause analysis and risk management for digital engineering, Business process analysis and outcomes prediction, Environmental sustainability analysis.	6	CO3
4.	Digital India & e-Governance: Initiatives, Infrastructure, Services and Empowerment. Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit / Debit Cards, e-Wallets,	4	CO4
5.	Digital Twins Introduction to digital twins and demonstration of use cases, Introduce the key enabling technologies for digital twins -such as ontologies, AI, and IoT, Design detailed digital twin architectures including solutions for interoperability, Standards available to design and develop digital twins, Develop digital twin demonstrations considering the spectrum of data, model and visualisation interfaces.	6	CO5
6.	Adaptive visualisation Introduction to visualisation methods, Awareness of human machine interfaces and the associated challenges and solutions , Communication skills for effective illustration and collaboration on complex results, Design and develop dashboards, virtual and augmented reality demonstrators	4	CO6

Text Books:

1. Understanding the digital world: what you need to know about computers, the Internet, privacy, and security Book by Brian W. Kernighan 2021 Second edition
2. Enterprise Architecture for Digital Business by Geng Lin, Lori A. MacVittie Released July 2022 Publisher(s): O'Reilly Media, Inc. ISBN: 9781098121457
3. Handbook Of Digital Enterprise Systems: Digital Twins, Simulation And Ai 1st Edition by Wolfgang Kuhn
4. Digital India: Governance Transformation, by K S Nippani, B K Murthy, itasta Publishing Pvt Ltd
5. Building Industrial Digital Twins: Design, develop, and deploy digital twin solutions for real-world industries using Azure Digital Twins, by ShyamVaranNath, Pieter van Schalkwyk, Dan Isaacs, Packt Publishing Limited.

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Course Code	Course Name	Teaching Scheme(Contact Hours 2/week)			Credits Assigned	
		Theory	Practical	Tutorial	Lab	Total
231ITUFP41	Python based Mini Project-I	-	4	-	2	2
		Evaluation Scheme				
		Practical / Oral / Practical & Oral				Total
		Term work	Oral	Practical		
		25	25	--		

Course Objectives:

1. Learn Basics, Functions, Decision Control and Strings of Python programming.
2. Understand Data Structures in Python.
3. Learn Object Oriented Programming using Python.
4. Understand GUI Programming and Database operations in Python.

Course Outcomes:

On successful completion of course, learner/student will be able to

1. Describe the Data Types, Numbers, Math functions, Strings and Strings Operation
2. Use different Decision Making, Looping Statements and Functions in Python
3. Perform various data structures using python like list, tuple and dictionary.
4. Interpret Object oriented programming concepts in Python.
5. Implement various python programs on Exception handling and File handling.
6. Explain how to design GUI Applications in Python and evaluate different database operations.

Prerequisite: Java Programming

Suggested list of experiments:


Expt. No.	Title of Experiment	CO Mapping
1.	Introduction to Python Programming: The Python Programming Language, History, features, Installing Python, Running Python program, Debugging Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses, Variables and Expressions Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.	CO1
0.	Decision and Control Statement: Introduction to Decision Control Statement, Ifstatement, If-Else statement, Nested if statement ,If ,While Loop, ForLoop,Nested Loop Break, Continue,pass, Function Definition, Function Call	CO2
0.	Data Structure: List, Arrays, Tuples, Dictionary,Sets,Range	CO3
0.	OOPs Concept in Python: Class, Object, Inheritance, Polymorphism, Encapsulation, Instance and Static Variables, Garbage Collection	CO4
0.	Exception handling and File handling: Try block, except block , reading, writing and deleting file, file operations	CO5
0.	GUI and Database Operations: Graphical User interface , Tkinter, Python database connectivity, MySQL	CO6
0.	Mini Project Guidelines: <ul style="list-style-type: none"> Students should be made into a group of 3-4 members. Students should understand problems effectively and propose multiple solutions. Students can take on self study, societal, innovative or may take existing case study problems. Students can do data exploratory analysis, preprocessing and data visualization using Scatter plot,Lineplot,Barplot,Histogram,Boxplot,Pair plot etc. Report Should be prepared as per guidelines. Mini Project shall be assessed through presentation and demonstration of working model in front of external and internal examiners Students shall motivated to publish at least one conference paper. 	CO6

Text Books:

1. James Payne, Beginning Python: Using Python 2.6 and Python 3.1, Wrox Publication
2. Dr. R. Nageswara Rao, Core Python Programming, DreamTech Press, Wiley Publication

Reference Books:

1. Wesley J Chun, Core Python Applications Programming, Pearson Publication, Third Edition.
2. E. Balguruswamy, Introduction to Computing and Problem Solving using Python, McGraw Hill Publication
3. Learn to Master Python, from Star EDU solutions, by Script Demics.
4. Reema Thareja, Python Programming using Problem Solving Approach, Oxford Press.

 <div>D Y PATIL DEEMED TO BE UNIVERSITY —RAMRAO ADIK— INSTITUTE OF TECHNOLOGY NAVI MUMBAI</div>		B.TECH IN INFORMATION TECHNOLOGY			SECOND YEAR SEM- IV	
Course Code	Course Name	Teaching Scheme (Contact Hours 2/week)			Credits Assigned	
		Theory	Practical	Tutorial	Lab	Total
231ITUCL41	Operating System Lab	-	2	-	1	1
		Evaluation Scheme				
		Practical / Oral / Practical & Oral				Total
		Term Work	Oral	Practical		
		25	--	25	50	

Course Objectives:

1. To install and investigate the concept of the boot process of Unix/Linux
2. To implement different run-level and GRUB password
3. To understand different basic commands on Linux for handling inodes and their attributes.
4. To implement different processes and disk scheduling with CRON

Course Outcomes (CO): At the end of the course learner will able to :

1. Install the Operating system and debug errors while loading the operating system.
2. Understand different run-levels of the Operating System and grub password
3. Implement shell script using GREP
4. Understand file system of UNIX and mounting of drive using FSTAB
5. Implement different CPU process and disk scheduling
6. Implement real time task scheduling using CRON and ANACRON

Prerequisite: Data Structures and Analysis, Computer Programming

Suggested list of experiments


Expt. No.	Title of Experiment	CO Mapping
1	Installation of Linux with disk druid method and its partitions.	CO1
2	Exploring the boot process of Unix/Linux and implementing practicals on it (for example MBR, passing different parameters to the kernel, doing different activities while booting and power-off).	CO1
3	Exploring different run-levels and setting GRUB passwords.	CO2
4	Exploring basic commands for handling File systems and hierarchy of Unix/Linux for handling inodes and their attributes.	CO2
5	Exploring basic commands like Creating groups, chown, chmod, uname, tty, diff, umask, tra, dd, SYMLINKS, HARDLINKS etc	CO2
6	To demonstrate the basic shell scripting techniques using programs such as pattern matching utilities.	CO3
7	Exploring manual and auto mounting different drives using FSTAB file and Linux file system structure	CO4
8	Write a program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN	CO5
9	Demonstrate Tuning Hard Disk Performance and expand logical volume during run time	CO5
10	Scheduling different tasks and processes using CRON and ANACRON and Profiling of users' environments in Linux	CO6
11	Capstone Project (Kernel Compilation)	CO2,CO3.CO6

Text Books:

1. Richard Peterson, Linux Complete Reference, Sixth edition Tata McGraw Hill
2. Christopher Negus, Linux Bible, Willey Publication

Reference Books:

1. The Linux Command Line by William E. Shotts
2. Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, Operating System Concepts, Ninth Edition, Wiley Publication

 D Y PATIL DEEMED TO BE UNIVERSITY —RAMRAO ADIK— INSTITUTE OF TECHNOLOGY NAVI MUMBAI		B.TECH IN INFORMATION TECHNOLOGY			SECOND YEAR SEM- IV	
Course Code	Course Name	Teaching Scheme (Contact Hours 2/week)			Credits Assigned	
		Theory	Practical	Tutorial	Lab	Total
231ITUCL42	Data Communication and Computer Network Lab	-	2	-	1	1
		Evaluation Scheme				
		Practical / Oral / Practical & Oral				Total
		Term Work		Oral	Practical	
		25		25	--	

Course Objectives:

1. Understand the TCP/IP and OSI protocol suite's architecture and principles.
2. Analyze the behavior and functionality of OSI protocol stack.
3. Design and implement networked systems using OSI protocol stack.
4. Apply networking principles to solve real-world networking problems.

Course Outcomes (LO): At the end of the course learner will be able to :

1. Analyze the architecture and principles of the TCP/IP protocol suite.
2. Analyze the behavior and functionality of the Data link layer for wired networks.
3. Design and implement networked systems based on network layer features.
4. Collaborate effectively in network design and analysis in the transport layer.
5. Analyze features and use of Application layer protocols.
6. Apply networking knowledge to solve practical networking challenges.

Prerequisite:

1. Basic understanding of computers.
2. Basic Internet search skills.
3. Basic knowledge of computer networking.

Suggested list of experiments:


Expt. No.	Title of Experiment	CO Mapping
1.	Basic Switch and End Device Configuration.	CO1
2.	Installation of Wireshark and Use it for monitoring network traffic, ethernet frame and MAC address.	CO2
3.	Configure network design with SSH and TELNET.	CO2
4.	Test network latency with Ping, Traceroute And Nslookup, etc	CO3
5.	Setup a VLAN network configuration with Trunk.	CO3
6.	Configuration of EtherChannel and VPN.	CO4
7.	Configuration of Static routing protocol (RIP)	CO4
8.	Configuration of Dynamic routing protocol (OSPFv2)	CO5
9.	Configuration of Application servers for example FTP, HTTP, SMTP	CO6
10.	Configuration of network management protocol SNMP.	CO6
11.	Capstone Project	CO2, CO3, CO5

Text Books:

1. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, 2018, 6th Edition.
2. Behrouz A. Forouzan, Data Communications and Networking with TCP IP Protocol Suite, McGraw Hill, 2022, Standard Edition.

Reference Books:

1. Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, 2010, Pearson, 5th Edition.
2. W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, Pearson Education India, 2011, 2nd Edition.
3. Steve McQuerry, CCNA self Studying, Cisco Press, 2003, 2nd Edition.

 <div>D Y PATIL DEEMED TO BE UNIVERSITY —RAMRAO ADIK— INSTITUTE OF TECHNOLOGY NAVI MUMBAI</div>		B.TECH IN INFORMATION TECHNOLOGY				THIRD YEAR SEM- IV	
Course Code	Course Name	Teaching Scheme (Contact Hours 10)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Total	
231ENUAU41	Constitution Of India	1	-	-	--	--	
		Evaluation Scheme					
		Theory				Total	
		Internal Assessment			End Sem. Exam		
		IA1	IA 2	Avg of IA			MSE
		--	--	--	--	--	

Course Objectives:

1. To gain familiarity with fundamental duties and rights of citizens of India
2. To sensitize students about constitution of India
3. To bring awareness about functioning of local , state and union government administration
4. To understand functioning of Panchayati Raj
5. To understand Election Commission role and functioning

Course Outcomes:

On successful completion of course learner/student will be able to:

1. Describe historical background of the constitution.
2. Explain the value of the fundamental rights and duties for becoming good citizen of India
3. Analyse the decentralisation of power between central, state and local self-government
4. Apply the knowledge in strengthening of the constitutional institutions
5. Analyse the features of Indian constitution

Module No	Contents	Hrs. (30)	CO
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1.	Introduction: Constitution' meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy	2	CO 1
2.	Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha	2	CO 2
3.	State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.	2	CO 3
4.	Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,	2	CO 4
5.	Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy Election Commission Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women	5	CO 5

Text Books:

1. Laxmikanth, "*Indian Polity*", Tata McGraw Hill, 2017.
2. Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt.Ltd. New Delhi
3. Subash Kashyap, Indian Constitution, National Book Trust.
4. Dynamics of Indian Government & Politics D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 vols, Universal Law Publications.
6. Subhash Kashyap, "*Indian Administration*", 2001.
7. Avasthi and Maheshwari, "*Indian Administration*", 2001