CO201N DISCRETE STRUCTURE AND GRAPH THEORY

Teaching Scheme: 03L + 00T, Total: 03 **Credit: 03**
Evaluation Scheme: 10ISA + 30MSE + 60ESE **Total Marks: 100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces the student set theory-symbolic logic. Methods of proofs including graphs, tree, groups and rings concept and its algorithm and to demonstrate how these concepts can be applied to solve non trivial real life problems.

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Explain the fundamental concepts of set theory, propositional logic, and the principles of mathematical induction.
2. Analyze properties of binary relations, equivalence relations, and partial orders and lattice,groups and rings.
3. Apply functions, recurrence relations, and generating functions to solve discrete mathematical problems, such as the job scheduling problem.
4. Synthesize and evaluate concepts in graph theory and tree structures to solve complex problems involving paths, circuits, and spanning trees.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	1	1	1	-	-		-	-	-	-	1	1	-	3
2	1	3	2	3	-	-	-	-	-	-	-	1	1	-	3
3	1	2	3	2	-	-	-	-	-	-	-	1	1	-	3
4	1	2	2	1	-	-	2	-	-	-	-	1	1	-	3

1- Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Sets Theory and Propositions: Sets, venn diagrams, operations on sets, combination of sets, finite and infinite sets, uncountably infinite sets, power set and cartesian products, principle of inclusion and exclusion**.** propositions, conditional propositions, logical connectivity, propositional calculus, universal and existential quantifiers, mathematical induction.

Relations: Definitions, properties of binary relations, equivalence relations and partitions, partial ordering relations and lattices, chains and antichains.

Functions: Definitions, domain & range, classification of functions, inverse and composition, pigeonhole principle, discrete numeric functions and generating functions, job scheduling problem. recurrence relation, linear recurrence relations with constant coefficients, homogeneous solutions, total solutions.

Graphs: Basic terminology, multigraphs and weighted graphs, subgraphs, isomorphic graphs, complete, regular and bipartite graphs,operations on graph, paths and circuits, factors of a graph, planer graph,graph coloring, hamiltonian and euler paths and circuits, graph algorithms- dijkstra shortest path algorithm, traveling salesman problem.

Trees: Definition properties and example, rooted trees, path length in rooted trees, weighted trees and prefix codes, binary search trees, spanning trees and cut set, Kruskal's and Prim's algorithms for minimum spanning tree.

Groups and Rings: Algebraic systems, groups, semi groups, monoids, subgroups, permutation groups, codes and group codes, isomorphism and automorphisms, homomorphism and normal subgroups, ring, integral domain, field, ring homomorphism, polynomial rings and cyclic codes

TEXT BOOKS:

1- Elements of Discrete Mathematics ,C.L.Liu , D.P.Mohapatra, 4th Edition, Tata McGraw-Hill, 2012, ISBN 10: 1259006395 / ISBN 13: 9781259006395

2- Discrete Mathematics, R. Johnson Baugh, 6th Edition, Pearson Education, 2005.

Reference Books:

1- Discrete Mathematics, N. Biggs, 2nd Edition, Oxford,2002 ISBN-13: 978-0198507178 ISBN-10: 0198507178

2- Discrete Mathematics with Graph Theory, E. Goodaire, M. Parameter, 2nd edition, Pearson Education,2003 ISBN 81 - 7808 - 827 - 4

3- Graph theory with application to Engineering and Computer Science, N. Deo, Prentice Hall of India, 1990, 0 - 87692 - 145 – 4.

CO202N DIGITAL ELECTRONICS AND LOGIC DESIGN

Teaching Scheme: 02L+ 00T , Total: 02 **Credits:02**
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks: 100**
ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course introduces number systems, Boolean Algebra, combinational logic circuits, sequential circuits and counters, memory and programmable Logic.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

1. Explain fundamentals of digital electronics and logic design.
2. Perform binary arithmetic and minimization of digital circuits.
3. Design combinational and sequential logic circuits.
4. Apply concepts of sequential circuits and memories for digital system design.
5. Verify, test and design any digital logic circuit.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1									1	1	2	-
2	3	1	2	1	2								1	2	-
3	3	2	3	2	2	2	1	1	1	1			1	2	-
4	3	1	2	2	2	2	1	1	1	1		1	1	2	-
5	3	2	3	2	2	2	1	1	2	2		2	1	2	-

1 - Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Number Systems and Codes: binary, octal and hexadecimal representations and conversions, Binary arithmetic, 2's complement arithmetic, ASCII code, Gray code, Excess three codes, Error detecting and correcting codes.

Boolean Algebra: Basic gates, Universal gates, their truth tables and circuits, DeMorgan's theorem, Boolean Laws, SOP and POS expressions, minimization of logic expressions by algebraic method, K-map method.

Combinational Logic Circuits: Concept of combinational and sequential circuits, Binary half and full adders and subtractors, Binary adder, BCD adder, code converters binary to gray, gray to binary, BCD to

7-Segment, Arithmetic Logic Unit(ALU) , parity generators, encoders, decoders,Multiplexers, cascading of multiplexers, Demultiplexers, cascading of Demultiplexers and their applications.

Sequential Logic Circuits and Counters: Flip-Flops- S-R, J-K, D-Type, T-Type flip flops, applications of flip-flops, Shift registers & its applications, Counters- types of counters, asynchronous and synchronous counters, modulus of a counter, mod-n counters, UP/DOWN counters , Ring counter, Johnson counter, Decade counter.

Memory and Programmable Logic: expanding memory size , classification, characteristics and types of memories, Read Write Memory, Random Access Memory (RAM), Multiport RAM, DDR RAM, Read Only Memory (ROM), Programmable Read Only Memory (PROM), Erasable Programmable Read Only Memory (EPROM) and Flash Memories, Content Addressable Memory, First In First Out (FIFO) Memory, Charge Coupled Devices Memory, Programmable Logic Array, Programmable Array Logic.

TEXT BOOKS:

1. R. P Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill, 2010. ISBN 978-0070669116
2. R. P. Jain & Thomas L. Floyd, "Digital Fundamentals", 8th edition, Pearson. ISBN 978-8177587630
3. D. P. Leach, A. P. Malvino, G. Saha ; "Digital Principles & applications", 8th Edition, Tata McGraw Hill, 2002, ISBN 978-9339203405

REFERENCE BOOKS:

1. M. Morris Mano, Michael D. Ciletti , "Digital Design: With an Introduction to the Verilog HDL", 5th edition, Prentice Hall, 2012, ISBN 978-0134549897

CO203N DATA STRUCTURES

Teaching Scheme: 03L+ 00T Total: 03 **Credits: 03**
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks: 100**
ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course introduces to students about data structure, how to allocate data in memory. To introduce various techniques for representation of the data in the real world.

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Explain the concepts and operations of various linked lists (singly, doubly, and circular) and apply these structures to implement linear data structures such as stacks and queues, as well as polynomial manipulations.
2. Differentiate between linear and non-linear data structures and analyze tree structures, including binary trees, binary search trees, and threaded binary trees.
3. Apply graph theory concepts to represent graphs using adjacency matrices and lists, and evaluate traversal algorithms such as depth-first search (DFS) and breadth-first search (BFS).
4. Design and implement symbol tables using AVL trees

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	2	2	1	2	-	2	-	-	2	3	2	3
2	2	3	3	3	1	1	2	-	2	-	-	2	1	2	3
3	2	2	2	2	1	1	2	-	2	-	-	2	1	2	3
4	2	2	2	2	1	1	2	-	2	-	-	2	3	2	3

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to Data Structures and Algorithm Analysis: Concept of data, data object, data structure, abstract data types (ADT), concept of primitive and non - primitive, linear and nonlinear, static and dynamic, persistent and ephemeral data structures, functions, structure and pointer. Space and time complexity,Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω,Theta), Problems on time complexity calculation.

Array as a Data Structure : ADT of array, Operations,Array applications - Searching ,Sequential search,Binary Search,Sentinel search , Probability search, ordered list search

Linked List: Introduction of Linked Lists, Realization of linked list using dynamic memory management,operations, Linked List as ADT, Types of Linked List: singly linked, linear and Circular Linked Lists, Doubly Linked List, Primitive Operations on Linked List-Create, Traverse, Search, Insert, Delete, Sort, Concatenate.Polynomial Manipulations-Polynomial addition.Generalized Linked List (GLL) concept, Representation of Polynomial using GLL.

Stack: Basic concept, stack Abstract Data Type, Representation of Stacks Using Sequential Organization,stack operations, Multiple Stacks,Applications of Stack- Expression Evaluation and Conversion, Polish notation and expression conversion, Need for prefix and postfix expressions, Postfix expression evaluation,recursion concept, variants of recursion- direct, indirect

Queue: Basic concept, Queue as Abstract Data Type, Representation of Queue using Sequential organization,Queue Operations, Circular Queue and its advantages, Multi-queues,Linked Queue and Operations. Deque-Basic concept, types (Input restricted and Output restricted), Priority Queue-Basic concept, types (Ascending and Descending).

Tree : Tree terminology-Binary Tree,full binary tree,complete binary tree,Binary Search Tree,Tree traversal techniques,Implementation and Operations on Binary Search Tree - Create, Insert, Delete, Search,Tree traversals– preorder, inorder, postorder (recursive implementation),AVL trees

TEXT BOOKS:

1. Data Structures,Seymour Lipschutz, Schaum's Outlines Tata McGraw Hill, 2006.
2. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Galgotia Publication.

REFERENCE BOOKS:

1. Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN-0-201-43578-0
2. Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
3. File organization and processing, A. Tharp ,2008 ,Wiley India edition ,9788126518685
4. An introduction to data structures with Applications, J. Tremblay, P. Soresan, 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
5. ADTs' Data Structures and Problems with C++, Larry Nyhoff,Pearson Publications

CO204NX SOFTWARE ENGINEERING

Teaching Scheme: 03L + 01T, Total: 04 **Credit:04**
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks:100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces students to the knowledge of Software Development Life Cycle, Software Engineering Process, Agile development process, SCRUM process, requirement engineering, software design, software testing principles and project planning & management concepts to develop quality software economically, automation and trends in software engineering.

COURSE OUTCOMES:

On the successful completion of this course students shall be able to ;

1. Explain the fundamental principles of software engineering, including the nature of software, unique characteristics of web applications, and various software process models.
2. Gather and analyze software requirements using techniques such as use case development, UML modeling, and data flow diagrams.
3. Synthesize knowledge from software design principles to develop robust software architectures and user interfaces.
4. Evaluate various agile development methodologies, such as Extreme Programming, Scrum, and Lean Software Development.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1		-	1	-	-	-	-	-			1		3
2		1		-	1	-	-	-	-	1		1	1		3
3			2	-	1	-	-	-	-	-		1	1		3
4	2	-	1	-	1	-	-	-	-		3	1	1		3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENTS:

Software Engineering Process- Nature of software, unique nature of webApps, software engineering, the software process**,** software engineering practice–the essence of practice and general principles, myths Process models – Generic process model, process assessment and improvement, prescriptive models, specialized models, unified process, product and process.

Requirement Engineering- Requirements engineering (-inception, elicitation, elaboration, specification,

validation, negotiation), eliciting requirements, developing use cases, building requirements model, negotiating requirements, validating requirements.

Requirements Analysis – Basics, scenario based modeling, UML models, data modeling, data and control flow model, behavioral modeling.

Software Design – Design within the context of software engineering, the design process, **Design** concepts, design model, Software architecture, architectural styles, architectural design, assessing alternative architectural designs.

User Interface Design – Golden rules– place the user in control, reduce user's memory load, make the interface consistent. User interface analysis and design models and process, Interface design steps – applying design steps, user interface design pattern, Interface design issues. Interface Design principles and guidelines.

Formal Modeling, SCM and Trends in Software Engineering- Cleanroom strategy, Functional Specification- black-box specifications, state-box specifications, clear-box specifications, cleanroom design, cleanroom testing. Software configuration management – SCM basics, SCM repository, SCM process. Emerging software engineering trends – technology evolution, process trends, collaborative development, model-driven development, test-driven development.

Agile Development Process – Agility, agility and cost of change, agility principles, The Politics of Agile Development, Human Factors. Extreme Programming – XP values, XP process, industrial XP. Other Agile Process Models- Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modelling (AM), Agile Unified Process (AUP).

TEXT BOOKS:

1. Pressman, R, "Software Engineering: A Practitioner's Approach", 7th or 8th Edition, Singapore: McGraw Hill, 2010, ISBN- 9780071267823
2. Somerville, "Software Engineering", 9th Edition, New Jersey: Pearson Education, 2010, ISBN - 9788131762165.

REFERENCE BOOKS :

1. Schwaber, K. and Beedle, M., "Agile Software Development with SCRUM" , 1st Edition, New Jersey : Pearson, 2001, ISBN- 9780130676344.
2. Jalote P, "An Integrated Approach to Software Engineering", 3rd Edition, Narosa Publishing House, 2011, ISBN- 9788173197024.
3. Al, Pragmatic, "Agile Web Development with Rails" Ruby, ISBN- 9789350234303.

CO204NY INTERNET AND COMMUNICATION TECHNOLOGY

Teaching Scheme: 03L + 01T, Total: 04 **Credit: 04**
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks:100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces basic communication techniques and concepts of data communication. Provide knowledge of networking and different topologies of networks. It also provides encoding techniques for data. Introduce the layered model of the internet and its components.

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Explain the fundamental concepts of data communication, network models (OSI and TCP/IP), and signal conversion techniques.
2. Analyze various transmission media and bandwidth utilization techniques, including multiplexing and spread spectrum.
3. Design and implement error detection and correction mechanisms, utilizing techniques such as block coding, cyclic codes, and checksums.
4. Evaluate different medium access control methods (such as ALOHA, CSMA/CD, CSMA/CA) and multi-user modulation techniques (FDMA, TDMA, CDMA).

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	2	3	-	-	-	-	-	-	-	-	-	2	3
2	1	2	2	3	-	-	-	-	-	-	-	-	-	2	3
3	1	2	2	3	1	-	-	-	-	-	-	-	-	2	3
4	1	2	3	3	1		-	-	-	-	-	-	-	2	3

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Introduction: Data communication, networks, internet, protocols and standards, network models: OSI, TCP/IP, analog and digital data, periodic analog signal, digital signal, transmission impairments, data rate limits, performance. signal conversion: digital-to-digital, analog-to digital, analog-to-analog, digital-to-analog conversion.

Bandwidth Utilization and Transmission Media: Multiplexing spread spectrum, guided media and unguided media.

Switching: Circuit switched networks, datagram networks, virtual circuit networks, structure of switch.

Error Detection and Correction: Types of errors, redundancy, detection vs correction, fec vs retransmission, coding, modular arithmetic, block coding, linear block codes, cyclic codes, checksum, hamming code.

Data Link Control: Framing, flow control and error control protocols, protocols: stop-and-wait, go-back-n, selective-repeat, piggybacking, HDLC,PPP.

Medium Access, Ethernet and LAN: Random access: ALOHA, CSMA, CSMA/CD, CSMA/CA, controlled access, channelization, IEEE standards, different Ethernets, connecting devices, backbone networks, VLAN.

Multi-user digital: Modulation techniques such as frequency division multiple access (FDMA); time division multiple access (TDMA); code division multiple access (CDMA);

TEXT BOOKS:

1. B. A. Forouzan, "Data Communications and Networking", 4th Edition, TMH, 2009, ISBN-13-9780070634145.
2. A. S. Tanenbaum, "Computer Networks", 4th Edition, Pearson Education, 2005, ISBN-8177581651.
3. Larry L. Peterson, "Computer Networks: A Systems Approach", 5th Edition, Morgan Kaufmann Publishers, 2011, ISBN- 9789380501932.

REFERENCE BOOKS:

1. Matthew S. Gast, 802.11 Wireless Networks: The Definitive Guide", 2nd Edition, O'Reilly, 2005, ISBN-13: 978-0596100520
2. Alberto, Leon Garcia, "Communication networks- Fundamental concepts and key architectures", 2nd edition, TMH, 2004, ISBN- 9780070595019.

CO206N DIGITAL ELECTRONICS AND LOGIC DESIGN LAB

Teaching Scheme: 02P ; Total: 02 **Credit: 01**
Evaluation Scheme: 30 ICA 20 ESE **Total Marks: 50**

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO202N. The list given below is just a guideline.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Implement functions with logic gates.
2. Explain the concepts half and full adder and subtractor , analyze the code conversion circuits.
3. Verify the truth tables of flip-flops, multiplexers and demultiplexers.
4. Design and implement counters, timing circuits.

GROUP A

1. Verify truth tables of logic gates.
2. Implement Boolean expressions using universal gates.
3. Construct half adder/ half subtractor and test their functionalities.
4. Design and implement 4-bit Gray to Binary/ Binary to Gray Code Converters.
5. Realize IC7483 as parallel adder /subtractor.
6. Design and Implement BCD to 7 Segment display decoder.
7. Verify the truth table of multiplexers/ demultiplexers using IC's.

GROUP B

1. Verify the truth tables of JK and SR flip flops using ICs.
2. Verify the truth tables of T and D Flip-Flops using ICs.
3. Design and implement a 4 -bit ripple counter using IC.
4. Design and implement shift register.
5. Design and implement an up/down counter /ring counter.
6. Design and implement decade counter.
7. Implement arithmetic and logic functions using ALU.

NOTE:

ICA – Internal Continuous Assessment shall support regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by the student (journal) based on practical performance by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

CO207N DATA STRUCTURES LAB

Teaching Scheme: 02P Total: 02 **Credit:01**
Evaluation Scheme: 30ICA+20 ESE **Total Marks:50**
Duration of ESE: 03 Hr

Minimum 12 experiments (six from Group A and six from Group B) shall be performed to cover the entire curriculum of course CO203N. The list given below is just a guideline. . All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

GROUP A

1. Create a singly linked list with options:
   - insert (at the front, at the end, in the middle),
   - delete (at front, at the end, in the middle),
   - Display
2. Implement stack as an ADT using Linked List
3. Implement Queue as an ADT using Linked List
4. Accept input as a string and construct a Doubly Linked List for the input string with each Node contains, as a data one character from the string and performs: a) Insert b) delete c) Display forward d) Display backward.
5. Create binary trees and perform recursive and non-recursive traversals.
6. Create a binary search tree of mnemonics from assembly language (e.g. add, mult, div, sub etc.) and perform following operations:
   - Insert
   - Display Level wise
   - Height of the tree
   - search a node
7. Implement In order Threaded Binary Search Tree.

GROUP B

1. Represent a given graph using adjacency list or matrix and perform DFS and BFS. Use the map of the area around the college as the graph. Identify the prominent landmarks as nodes and perform DFS and BFS on that
2. Represent graph using adjacency list or matrix and generate minimum spanning tree using Prim's algorithm.
3. Implementation of AVL Tree.
4. Implementation of Hash table using array and handle collisions using Linear probing with or without replacement.
5. Implement all primitive operations on Sequential file in C
6. Write a program that reads an existing file using line sequential organization.
7. Write a program to implement a small database mini project to understand persistent objects and operations on sequential files (e.g. library information, inventory systems, automated banking system, reservation systems etc.) For example, write a program to create a database for a reservation system using information such as Name, sex, age, starting place of journey and destination. Program should have the following facilities
   - To display entire passenger list
   - To display particular record
   - To update record
   - To delete and sort record Use Exception Handling for data verification (Mandatory).

TEXT BOOKS:

1. Data Structures,Seymour Lipschutz, Schaum's Outlines Tata McGraw Hill, 2006.
2. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Galgotia Publication.

REFERENCE BOOKS:

1. Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN-0-201-43578-0
2. Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
3. File organization and processing, A. Tharp ,2008 ,Wiley India edition ,9788126518685
4. An introduction to data structures with Applications, J. Tremblay, P. Soresan, 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
5. ADTs' Data Structures and Problems with C++ Larry Nyhoff,Pearson Publications.

NOTE:

ICA – Internal Continuous Assessment shall support regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and the record submitted by the student (journal) based on practical performance by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institution.

CO250N Community Engineering Project / Field Project

Teaching Scheme: 00L+02P; Total: 02 **Credit:02**
Evaluation Scheme: 30 ICA+20ESE **TotalMarks:50**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION

This course is designed to provide students a hands-on, real-world experience in applying engineering principles to address the needs of local communities. This course emphasizes collaborative, interdisciplinary approaches to problem-solving, addressing both technical skills and community engagement. This course exposes students to the socio-economic issues in society so that the theoretical learning can be supplemented by actual life experiences to generate solutions to real-life problems.

COURSE OUTCOMES

On the successful completion of this course, students shall be able to -

1. Identify and define a problem statement from the requirements raised from literature survey /need analysis.
2. Build and test web applications for describing/solving real life problems.
3. Demonstrate the ability of team-work.
4. Write a comprehensive report of the project work and present it effectively.

MAPPING OF COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) (WITH STRENGTH OF CORRELATION)

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		3				2							2	2	3
2			3		2		2	2					2	2	3
3								2	3				2	2	3
4								2		3			2	2	3

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Guidelines:

- This course is a team activity having 2-3 students in a team. This is web-based building and testing for developing real life small web applications.
- This work may be a complete small programming aspect. It should encompass software models with basic html, css, bootstrap, etc.
- It should cater to a small system required in laboratory or real-life application. Based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of community engineering project (CEP).
- By designing a project that has direct community involvement; students learn valuable engineering skills and gain a sense of pride for contributing something beneficial to the community in general. At the end of the course, students should submit their project work along with a report and presentation.
- Minimum 10 experiments points (Four from Group A, Six from Group B) shall be performed to cover the entire curriculum of course CO250N for CEP Project. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should

include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tools/ technology is recommended for laboratory assignments. The concerned faculty member must conduct group-A contents in theory lectures.

HTML overview: Introduction, Editors, Basic, Elements, Attributes, Headings, Paragraphs, Styles, Formatting, Quotations, Comments, Colors, CSS, Links, Images, Favicon, Page Title, Tables, Lists, Block & Inline, Div, Classes, Id, Iframes, Forms, Forms, Form Attributes Form Elements, Input Types, Input Attributes, Input Form Attributes, Graphics, Media

CSS Overview: : What is CSS? Creating Style Sheet ,CSS Properties,CSS colors,css background,css borders,css margins,css padding,css height/width,css box model,css forms,css, texts, fonts, icons, links, tables, display, position, navigation bar

Bootstrap : What is responsive website?, Containers, Grid Basic, Typography, Colors, Tables, Images, Jumbotron, Alerts, Buttons, Button Groups, Badges, Progress Bars, Spinners, Pagination, List Groups, Cards, Dropdowns, Collapse, Navs, Navbar, Carousel, Modal, Tooltip, Popover, Toast, Scrollspy, Offcanvas, Utilities, Dark Mode, Flex, Forms, Select Menus, Checks and Radios,Range,Input Groups, Floating Labels,Form Validation

GROUP A

1. Develop and demonstrate a HTML document that illustrates a) the use of Formatting Text. b) Headings tags(H1,H2,H3,H4,H5,H6) c) Font Details (Font Size,Style, Type, Color) d) Setting Color(BG Color)
2. Develop and demonstrate a HTML document that illustrates a) Unordered List(UL) b) Ordered List(OL) and Definition list (DL) c) Table Alignment (Cell Spacing, Cell Padding ,Height ,Width, Border, Rowspan , colspan) d) Setting Different Table Attributes(Color, Image)
3. Design timetable of your class using table tags and background colors. Use colspan and rowspan.
4. Create an html page named as “registration.html” 1. Set background colors 2. Use table for alignment 3. Provide font colors & size.
5. Develop and demonstrate the usage of inline, internal and external style sheet using CSS

GROUP B

1. Design uses internal and external CSS that illustrates the ordered list, table, borders, padding, color, and the tag.
2. Create a simple webpage with a navigation bar, a jumbotron, and a footer using Bootstrap
3. Create a multi-column layout with rows and columns. Practice responsive grid classes like .col-sm-, .col-md-, .col-lg-, etc.
4. Create a registration form with inputs, radio buttons, checkboxes, and a submit button. Apply form validation using Bootstrap’s validation classes.
5. Create a top navigation bar with dropdowns, a search box, and a collapsible menu for smaller screens.
6. Design a portfolio page with cards displaying images and descriptions. Experiment with card groups, decks, and alignment.
7. Create a webpage with a button that triggers a modal popup. Include alerts and toasts that provide feedback based on user actions.
8. Create a webpage that displays a data table with Bootstrap’s table classes. Implement pagination for the table.
9. Design a web page using Bootstrap’s utility classes for margin, padding, text alignment, text color, and background color.

10. Create a carousel slider with images, captions, and controls. Customize the appearance and behavior using Bootstrap classes.

11. Create a webpage that uses various Bootstrap Icons to enhance UI/UX. Explore using icons in buttons, forms, and navigation.

12. Develop a responsive multi-page website (e.g., a portfolio or business site) using Bootstrap 5, incorporating a navbar, grid layout, forms, modals, carousels, and customized styling.

REFERENCE BOOKS:

1. Beginning HTML, XHTML, CSS, and JavaScript,John Duckett, Wiley India publications.

NOTE :

ICA – Internal Continuous Assessment shall support regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and the record submitted by the student (journal) based on practical performance by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

MDM
CPM205N: OBJECT ORIENTED PROGRAMMING

Teaching Scheme: 02L+00P; Total: 02 **Credits: 02**
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks: 100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces the concept of Object Oriented Programming(OOP). This course introduces the student with the knowledge of class communication, inheritance, polymorphism and exception handling.

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Compare programming paradigms like procedural oriented programming ,oop,generic programming ,modular programming
2. Implements concepts like data abstraction,data encapsulation,inheritance and polymorphism in c++ programming.
3. Apply templates, exceptions, streams in OOP.

MAPPING OF COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) (WITH STRENGTH OF CORRELATION)

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	3	2	1	-	2	-	-	-	-	1	3	2	2
2	1	3	2	1	1	-	1	-	-	-	-	1	3	2	2
3	1	3	3	1	1	-	1	-	-	-	-	1	3	2	2

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

Course contents:

Introduction to Object Oriented Programming: Introduction to procedural, modular, object oriented and generic programming techniques, limitations of procedural programming, need of object-oriented programming.

Classes and Objects: Defining a class, data members and methods, public, private and protected members, inline member functions, static data members, static member functions, 'this' pointer, constructors, destructors, friend function, dynamic memory allocation, array of objects, pointers and classes.

Operator Overloading: Introduction, need of operator overloading, overloading the assignment, binary and unary operators, overloading using friends, rules for operator overloading.

Inheritance and Polymorphism: Introduction, base and derived classes, friend classes, Inheritance types, access modifiers, Single inheritance, multiple and multilevel inheritance, hybrid, hierarchical inheritance, ambiguity, virtual base classes, Overriding base class members, Pointers to base and derived classes, Virtual functions, rules for virtual functions, polymorphism, pure virtual functions.Virtual base classes.

Templates: Introduction, templates: function templates and class templates, function overloading vs. function templates, member function templates and template arguments.

Managing Console I/O Operations: Introduction, C++ streams, stream classes, unformatted I/O, formatted I/O and I/O manipulators.

TEXT BOOKS:

1. Object Oriented Programming with C++ by E. Balagurusamy.
2. Let Us C++, Yashavant P. Kanetkar, Second Edition, BPB Publications, 2003.

REFERENCE BOOKS:

1. Object-Oriented Programming in C++, Rajesh K. Shukla, Wiley India, 2008.
2. Object-Oriented Programming with ANSI and Turbo C++ , Ashok N. Kamthane, Pearson Education, 2006.

MDM

AIM205N: DATA MINING

Teaching Scheme: 02L + 00T, Total: 03 **Credit: 02**

Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks: 100**

Duration of ESE: 03 Hrs.

COURSE DESCRIPTION:

This course introduces the students to learn and practice data modeling using various techniques of data mining. It also encourages use of data warehouse, OLAP to extract knowledgeable information for decision support systems.

COURSE OUTCOMES:

On the successful completion of this course student shall be able to;

1. Arrange basic, intermediate and advanced techniques to mine the data
2. Measure the output generated by the process of data mining
3. Evaluate the hidden patterns in the data
4. Assess the mining process by choosing best data mining technique

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) , COURSE OUTCOMES (COS) AND PROGRAM SPECIFIC OUTCOMES (PSOS) , MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	3	-	-	-	-	-	1	-	3	1	2	1	1
2	1	-	3	-	2	-	-	-	2	1	3	1	3	1	2
3	1	-	3	-	-	-	-	-	2	-	3	1	2	1	1
4	1	2	3	-	-	-	-	-	1	-	3	1	2	1	1

1- Weakly correlated **2 – Moderately correlated** **3– Strongly correlated**

Course contents:

Introduction of Data Mining- Data Mining Task Primitives, Data: Data, Information and Knowledge; Attribute Types: Nominal, Binary, Ordinal and Numeric attributes, Discrete versus Continuous Attributes; Introduction to Data Preprocessing, Data Cleaning: Missing values, Noisy data; Data integration: Correlation analysis; transformation: Min-max normalization, z-score, normalization and decimal scaling; data reduction: Data Cube Aggregation, Attribute Subset Selection, sampling; and Data Discretization: Binning, Histogram Analysis.

Data Warehouse- Operational Database Systems and Data Warehouses(OLTP Vs OLAP), A Multidimensional Data Model: Data Cubes, Stars, Snowflakes, and Fact Constellations Schemas; OLAP Operations in the Multidimensional Data Model, Concept Hierarchies, Data Warehouse Architecture, The Process of Data Warehouse Design, A three-tier data warehousing architecture, Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP.

Measuring Data Similarity and Dissimilarity- Proximity Measures for Nominal Attributes and Binary

Attributes, interval scaled; Dissimilarity of Numeric Data: Minkowski Distance, Euclidean distance and Manhattan distance; Proximity Measures for Categorical, Ordinal Attributes, Ratio scaled variables; Dissimilarity for Attributes of Mixed Types, Cosine Similarity.

Association Rules Mining-Market basket Analysis, Frequent item set, Closed item set, Association Rules, a-priori Algorithm, Generating Association Rules from Frequent Item sets, Improving the Efficiency of a-priori, Mining Frequent Item sets without Candidate Generation: FP Growth Algorithm; Mining Various Kinds of Association Rules: Mining multilevel association rules, constraint based association rule mining, Meta rule-Guided Mining of Association Rules.

Classification-Introduction to: Classification and Regression for Predictive Analysis, Decision Tree Induction, Rule-Based Classification: using IF-THEN Rules for Classification, Rule Induction Using a Sequential Covering Algorithm. Bayesian Belief Networks, Training Bayesian Belief Networks, Classification Using Frequent Patterns, Associative Classification, Lazy Learners-k-NearestNeighbor Classifiers, Case-Based Reasoning.

Multiclass Classification- Semi-Supervised Classification, Reinforcement learning, Systematic Learning, Wholistic learning and multi-perspective learning. Metrics for Evaluating Classifier Performance: Accuracy, Error Rate, precision, Recall, Sensitivity, Specificity; Evaluating the Accuracy of a Classifier: Holdout Method, Random Sub sampling and Cross-Validation.

TEXT BOOKS:

1. Han, Jiawei Kamber, Micheline Pei and Jian, ―Data Mining: Concepts and Techniques‖, Elsevier Publishers, ISBN:9780123814791, 9780123814807.
2. Parag Kulkarni, ―Reinforcement and Systemic Machine Learning for Decision Making‖ by Wiley-IEEE Press, ISBN: 978-0-470-91999-6

REFERENCE BOOKS:

1. Matthew A. Russell, "Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More" , Shroff Publishers, 2nd Edition, ISBN: 9780596006068
2. Maksim Tsvetovat, Alexander Kouznetsov, "Social Network Analysis for Startups:Finding connections on the social web", Shroff Publishers , ISBN: 10: 1449306462

MDM

DCM205N: Data Science and Tools

Teaching Scheme: 02 **Credit: 02**
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks:100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course aims to provide students with a comprehensive understanding of data science concepts, methodologies, and tools. By the end of the course, students will be equipped to perform data analysis, build predictive models, and communicate data-driven insights using various data science tools.

COURSE OUTCOMES (COS):

On the successful completion of this course student shall be able to

1. Explain the fundamentals of data science.
2. Explain various data science tools for data manipulation and visualization.
3. Analyze various predictive models and their performance using machine learning.
4. Use different data visualization techniques and tools.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) , COURSE OUTCOMES (COS) AND PROGRAM SPECIFIC OUTCOMES (PSOS) , MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	3	-	-	-	-	-	1	-	3	1	2	1	1
2	1	-	3	-	2	-	-	-	2	1	3	2	3	1	2
3	1	-	3	-	-	-	-	-	2	-	2	1	2	1	1
4	1	2	3	-	-	-	-	-	1	-	3	1	2	1	1

1- Weakly correlated **2 – Moderately correlated** **3– Strongly correlated**

CONTENTS:

Introduction to Data Science (4 Hours): What is Data Science? Roles in Data Science**:** Data Scientist, Data Engineer, Data Analyst, Applications of Data Science, Data Science Lifecycle**:** Data collection, preparation, exploration, modeling, and interpretation.

Data Handling and Manipulation (6 Hours): Data Types and Structures: Structured vs. Unstructured data.Data Manipulation in Python/R: Numpy and Pandas (Python) Data frames and matrices (R), Data Cleaning Techniques: Handling missing values, data transformation, normalization, Working with Databases: SQL for data extraction and manipulation.

Exploratory Data Analysis (EDA) (4 Hours): Importance of EDA, Techniques and Tools for EDA**:** Descriptive Statistics, Data Visualization using Matplotlib, Seaborn (Python), ggplot2 (R), Identifying Patterns and Relationships in Data, Feature Engineering**:** Creating new features from existing data.

Machine Learning Basics (6 Hours): Introduction to Machine Learning, Supervised vs. Unsupervised Learning, Common Algorithms**:** Linear Regression, Logistic Regression, Decision Trees, Random Forest, K-Means Clustering, Model Evaluation**:** Accuracy, Precision, Recall, F1 Score, Cross-validation.

Data Visualization and Communication (4 Hours): Principles of Data Visualization, Tableau/Power BI basics

TEXT BOOKS:

1. Introduction to Data Science: A Python Approach for Beginners" by Laura Igual and Santi Seguí
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett
3. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" by Wes McKinney
4. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data" by Hadley Wickham and Garrett Grolemund
5. SQL for Data Scientists: A Beginner's Guide for Building Datasets for Analysis" by Renee M. P. Teate
6. Exploratory Data Analysis with R" by Roger D. Peng
7. Python Data Science Handbook: Essential Tools for Working with Data" by Jake VanderPlas

REFERENCE BOOKS:

1. Data Visualization with ggplot2: Create Elegant Data Visualizations Using the Grammar of Graphics by Hadley Wickham
2. Pattern Recognition and Machine Learning by Christopher M. Bishop
3. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems by Aurélien Géron
4. Machine Learning Yearning: Technical Strategy for AI Engineers, In the Era of Deep Learning by Andrew Ng
5. Storytelling with Data: A Data Visualization Guide for Business Professionals by Cole Nussbaumer Knaflic
6. The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenario by Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave
7. Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures by Claus O. Wilke

MDM

DTM205N: Drone Technology

Teaching Scheme: 02 **Credit:** 02
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks:**100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course provides comprehensive training on advanced drone technology, evolution, communication systems, Indian regulations, obtaining pilot licenses, DGCA requirements, and practical flying skills essential for safe and legal drone operations

COURSE OUTCOMES:

On the successful completion of this course student shall be able

1. Explain components and features of drone systems, including hardware, software, and mechanical aspects, as well as ground-based controllers.
2. Analyze and interpret key drone regulations, including operational and procedural requirements, legal frameworks, and the implications of the Drone Rules 2021 and its amendments.
3. Classify drones based on their structural design, including fixed-wing, rotary-wing, and lighter-than-air systems, and evaluate their respective applications.
4. Apply principles of system architecture, mechanical design, and hardware integration, and explore the modern and future applications of drones, particularly in the Indian context.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) , COURSE OUTCOMES (COS) AND PROGRAM SPECIFIC OUTCOMES (PSOS) , MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	3	-	3	-	-	-	1	-	3	1	2	1	1
2	1	-	3	-	2	-	-	-	2	1	3	1	3	1	2
3	1	-	3	-	-	-	-	-	2	2	3	1	2	1	1
4	1	2	3	-	-	-	-	-	1	-	3	1	2	1	1

1- Weakly correlated **2 – Moderately correlated** **3– Strongly correlated**

CONTENTS:

Introduction to the Drones system : - What is Drone? Types of Drones, Parts of Drone System, Hardware, Software, Mechanical parts of a drone, Ground based Controllers and accessories. Features of Drone System (06 Hours)

Key features of Drone regulations:- Notification of final regulations for civil use, operational and procedural requirements, no drone zones, enforcement actions, relevant sections of aircraft act-1934, Drone rules 2021 and its amendments 2022. (03 Hours)

Structural Classification of Drones: - fixed wing structure, lighter than air systems, rotary wings aircraft (2 Hours)

Drone System Design Flow
System Design: Requirement Specifications. Architecture, Implementation
Mechanical design : 3 D model of the X-frame Definition, possible mechanical design variants of Drones. purpose, requirements, a Typical drone system stack-up Dependencies.
Hardware Design: Hardware requirements, Drone hardware block diagram and key components. Electrical Ingredients Selection, PCBA design, Floor Plan, Power architecture (10 Hours)

Key topics :-Introduction to remote sensing, digital image processing, GPS, GIS, Introduction to data processing, applications of drones, Modern and future prospects of drones in India (05 Hours)

TEXT / REFERENCE BOOKS

1. Syed Omar Faruk Towaha, "Building Smart Drones with ESP8266 and Arduino: Build exciting drones by leveraging the capabilities of Arduino and ESP8266" Packt Publishing, 2018

2. Aaron Asadi, "Drones The Complete Manual. The essential handbook for drone enthusiasts", Imagine Publishing Limited, 2016

3. https://www.asteria.co.in/

4. https://www.dji.com/

5. https://ijpiel.com/index.php/2022/10/07/drone-laws-of-india-off-to-a-flying-start/#:~:text=Further%2C%20according%20to%20Rule%2022,zone%20requires%20no%20prior%20permission.

SH201N: PROJECT AND FINANCE MANAGEMENT

Teaching Scheme: 02L +00P;Total:02 **Credit: 02**
Evaluation Scheme:10 ISA+30 MSE +60ESE **Total marks:100**
MSE Duration: 1.5 Hrs. **ESE Duration: 3.0 Hrs.**

COURSE DESCRIPTION:

The course is intended to provide basic understanding of project and financial management to engineering students with the basic and fundamental concept of project and finance. This course introduces the student to selection, appraisal, organization and planning of the project management as well as project scheduling and resource management. Students will study fundamental concepts, budget and budgetary control as well as leverage analysis and Working capital management.

COURSE OBJECTIVES:

The course is designed to achieve comprehensive learning outcomes across several key areas. Firstly, it introduces participants to the fundamental principles of project management, emphasizing techniques for project selection and appraisal to ensure alignment with organizational goals. Secondly, it covers project organization and planning strategies, including project scheduling and resource management techniques essential for efficient project execution. Additionally, the course delves into financial management principles, providing insights into leverage analysis and effective working capital management strategies to optimize financial resources within project environments. By integrating these topics, the course aims to equip participants with the knowledge and skills necessary to successfully manage projects while maintaining financial sustainability and achieving strategic objectives.

COURSE OUTCOMES:

On the successful completion of this course student will be able to

1. Apply the basic concept of project management
2. Demonstrate the ability to prepare projects and risk management
3. selection, appraisal, organization and planning of the project
4. assess the budget and budgetary control
5. analyze and evaluate the leverage and working capital management

COURSEOUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	2	-	-	2	3	3	3			3
2	-	-	-	-	-	2	-	-	2	3	3	3			3
3	-	-	-	-	-	2	-	-	2	3	3	3			3
4	-	-	-	-	-	2	-	-	3	3	3	3			3
5						2	-	-	2	3	3	3			3

l- Weakly correlated 2-Moderately correlated 3-Strongly correlated

CONTENTS:

Introduction to Project Management: What is a project? Evolution of project management, Importance of project management, Where is project management appropriate? Project Management Today—An Integrative Approach, Characteristics of projects, Characteristics of project management, Projects in contemporary organizations, Project lifecycle, Job conflict, Labour conflict, Material conflict.

Project Selection and Appraisal: Brainstorming and concept evolution, The Strategic Management Process: An Overview, The Need for an Effective Project Portfolio Management System, A Portfolio Management System, Applying a Selection Model, Managing the Portfolio System, Types of appraisals, SWOT analysis, Cash flow analysis, Payback period, and Net present value.

Project Organization and Planning: Project manager, Cross-functional team, Dedicated Project organization, Influence project organization, Matrix organization, Advantages and disadvantages of project organizations, Selection of project organization, Work Breakdown Structure (WBS), Integration of project organization and WBS, WBS and responsibility matrix, Risk Management Process, Contingency Planning

Project Scheduling and Resource Management: Gantt chart, Milestone chart, Network techniques: PERT and CPM, AON and AOA representation, Three time estimates, Using Probability distributions for time computation, Probability of project completion, Time scale version of network, Early start and late start schedules, Resource allocation, Resource loading and leveling, Constrained resource scheduling, Multi-project scheduling and resource allocation, Crashing a project.

Introduction to Financial Management: Finance and other discipline, nature and scope of financial management,Functions of financial management;Objectives of the firm, Sources of finance, long term sources, short term sources; Introduction and analysis of financial statement; Introduction & definition of **budget** and budgetary control, objectives, essential requirements, advantages and disadvantages, types of budgets- cash and flexible.

Leverage Analysis and Working Capital Management: Concepts, Operating leverage, Financial leverage, Combined leverage, Working capital management: Operating cycle, Determinants of working capital, Types of working capital, Importance of working capital, Components of working capital, Measuring working capital requirements

TEXT BOOKS:

1. Project Planning and Management with CPM and PERT, Kundan Singh & Dr. M.L. Kansal, HP Hamilton Limited, 2021.
2. Project Management Planning and Control Techniques, Rory Burke, 4th Edition, Wiley India Pvt. Ltd, 2010.
3. Project Management, Planning and Control, Albert Lester, 5th edition, Butterworth-Heinemann, 2007
4. Fundamentals of Financial Management,D.ChandraBose,2nd edition,PHI,2010

5. Project Management: The Managerial Process, Erik Larson , Clifford Gray, 6th edition,McGraw Hill Education, 2017
6. Project Management, Megha Jain, Sultan Chand&Sons,2020

REFERENCE BOOKS:

1. Projects:Planning, Analysis,Selection,Financing,Implementation,andReview Prasanna Chandra., 10th edition, McGraw Hill Education, 2022
2. Project Management–The Complete Process(with Case Studies from Renewable Energy Sector), Vishwanath Murthy, Sultan Chand & Sons 201
3. Project Management, Harvey Maylor, 5thedition, Pearson, 2021
4. Financial Accounting for Management, Paresh Shah, 3rd edition, Oxford University Press, 2019.
5. Financial Management Text, Problems and Cases, Khan& Jain, 8th edition,Tata McGraw Hill, 2018
6. Financial Management, Dr. P. C. Tulsian, 5th edition, S.Chand and company, 2017.
7. Financial Management, Ravi Kishore, 8th edition,Taxmann PublicationsPvt.Ltd, 2020

SH203N: ENVIRONMENTAL SCIENCE

Teaching Scheme: L: 02 T: 00 P: 00 **Credits:** 02
Evaluation Scheme: 20 ISA+30 MSE **Total:**50
MSE Duration: 1.5 Hrs. **ESE Duration:** 3.0 Hrs.

COURSE DESCRIPTION:

This course provides basic scientific knowledge and understanding of how our word works from an environmental perspective. Topics covered include energy resources, basic principles of ecosystem function; biodiversity and its conservation; human population growth; water, air and noise pollution; climate change and green chemistry.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of environment and importance of its protection

COURSE OUTCOMES:

On the successful completion of this course, student shall be able to–

1. Demonstrate primarily environmental problems.
2. Remember the concept of ecology, their structure and types, different components and their functions.
3. Understand abiotic and biotic factors and their relation to each other.
4. Apply various types of ecosystem, function, components of ecosystem and their stability.
5. Analyze the social issues and apply environmental acts.

RELEVANCE OF PROGRAM OUTCOMES (POS) AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	2	-	-	-	-	-
2	-	-	-	-	-	2	2	-	-	-	-	-
3	-	-	-	-	-	2	2	-	-	-	-	-
4	-	-	-	-	-	2	2	-	-	-	-	-
5	-	-	-	-	-	2	2	-	-	-	-	-

1- Weakly Correlated; 2 – Moderately Correlated; 3 - Strongly Correlated

COURSE CONTENTS:

Nature of Environment: Definition, scope and importance, multidisciplinary nature, need of public awareness.

Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, demand and their effects on forest and tribal people

Water resources: use and overutilization of surface and groundwater, floods, drought, conflicts over water, dams-benefits and problems,Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources,Food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity,Energy resources: growing energy needs, renewable and non-renewable energy resources Land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification. Roll of individuals in conservation of natural resources.

Ecosystem- Concept, structure and function of ecosystem, producers, consumers and decomposers, energy flow in ecosystem, ecological succession, food chain, food web and ecological pyramid, types of ecosystem-forest, grassland, desert and aquatic.

Biodiversity and Its Conservation- Introduction, definition, genetic, species and ecosystem diversity, biogeographical classification of India, India as mega diversity nation, hotspots of biodiversity, threats to biodiversity, habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity-In-situ and ex-situ conservation of biodiversity.

Environmental Pollution and Green Chemistry- Definition, causes, effects and control measures of –air pollution, water pollution, soil pollution, noise pollution, thermal pollution, nuclear hazards, role of individuals in prevention of pollution, concept of green chemistry, principles of green chemistry.

Social Issues and the Environment-Water conservation, rain water harvesting, watershed management, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, environmental protection act, air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act.

TEXT BOOKS

1. Environmental Studies for Undergraduate Courses, Erach Bharucha,4th edition, University Press, 2004.
2. Environmental Chemistry, O.D.Tyagi and Mehta, 4th edition, Anmol publication, 2016.
3. Environmental studies for undergraduate courses, Dr.D.K. Asthana, Dr. Meera Asthana, 2nd edition, S. Chand publication, 2012.

REFERENCES-

1. Green Chemistry Environmental Friendly Alternatives, Rashmi sanghi, M.M.Shrivastava, 3rd edition, Narosa publication, New Delhi, 2008.
2. Green Chemistry-Theory and Practice, Paul T Anastas and John C. Warner,1s Edition,Oxford University Press, 2000 V.K.
3. Environmental ChemistryA.K.De,3rdEdition,NewAgeInternationalPublishersLtd, New Delhi, 2010.
4. New Trends in Green Chemistry, V.K. Ahluwalia, M.Kidwai,1stEdition, Springer publisher, 2004.
5. Environmental Studies,BennyJoseph,3rdEdition,TataMcGraw-Hill publication, 2017.

CO251N DATA COMMUNICATION AND NETWORKING

Teaching Scheme: 02+ 00T **Total:** 03 **Credits:** 02
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100

ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course introduces basic communication techniques and concepts of data communication. Provide knowledge of networking and different topologies of network. It also provides encoding techniques for data. Introduce the layered model of the internet and its components.

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Explain the fundamental concepts of data communication and networking.
2. Illustrate Network models and identify their differences in implementation.
3. Describe various types of transmission media and their signal propagation characteristics associated with signal bandwidth, various switching methodologies.
4. Demonstrate the understanding of Networking concepts and protocol standards.
5. Apply the knowledge of physical layer and data link layer technologies, error detection and correction and modulation techniques.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	2	3	-	-	-	-	-	-	-	-	1	1	2
2	1	2	2	3	-	-	-	-	-	-	-	-	1	1	2
3	1	2	2	3	1	-	-	-	-	-	-	-	1	1	2
4	1	2	3	3	1		-	-	-	-	-	-	1	1	2

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Introduction: Data communication, networks, internet, protocols and standards, network models: OSI, TCP/IP, analog and digital data, periodic analog signal, digital signal, transmission impairments, data rate limits, performance. signal conversion: digital-to-digital, analog-to digital, analog-to-analog, digital-to-analog conversion.

Bandwidth Utilization and Transmission Media: Multiplexing spread spectrum, guided media and unguided media.

Switching: Circuit switched networks, datagram networks, virtual circuit networks, structure of switch.

Error Detection and Correction: Types of errors, redundancy, detection vs correction, fec vs retransmission, coding, modular arithmetic, block coding, linear block codes, cyclic codes, checksum, hamming code.

Data Link Control: Framing, flow control and error control protocols, protocols: stop-and-wait, go-back-n, selective-repeat, piggybacking, HDLC,PPP.

Medium Access, Ethernet and LAN: Random access: ALOHA, CSMA, CSMA/CD, CSMA/CA, controlled access, channelization, IEEE standards, different Ethernets, connecting devices, backbone networks, VLAN.

Multi-user digital: Modulation techniques such as frequency division multiple access (FDMA); time division multiple access (TDMA); code division multiple access (CDMA);

TEXT BOOKS:

1. Data Communications and Networking, B. A. Forouzan, 4th Edition, TMH, 2009, ISBN-13-9780070634145.
2. Computer Networks, A. S. Tanenbaum, 4th Edition, Pearson Education, 2005, ISBN-8177581651.
3. Computer Networks: A Systems Approach, Larry L. Peterson, 5th Edition, Morgan Kaufmann Publishers, 2011, ISBN- 9789380501932.

REFERENCE BOOKS:

1. 802.11 Wireless Networks: The Definitive Guide, Matthew S. Gast, 2nd Edition, O'Reilly, 2005, ISBN-13: 978-0596100520
2. Communication networks- Fundamental concepts and key architectures, Alberto, Leon Garcia, 2nd edition, TMH, 2004, ISBN- 9780070595019.
3. Computer Networking - A Top-Down Approach featuring the Internet,James F. Kurose, 6th Edition, Pearson Education, 2009, ISBN-13: 978-0132856201.
4. Computer and Communication Networks by Nader. F. Mir, 2nd Edition, Pearson Prentice Hall publishers, 2010, ISBN-13: 978-0-13-381474-3.

CO252N OPERATING SYSTEMS AND SYSTEMS PROGRAMMING

Teaching Scheme: 03L+ 00T **Total:** 03 **Credits:**03
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course introduces the role of the operating system on the computer. It provides the knowledge of process, thread, scheduling algorithms and process synchronization and memory management concepts and demonstrates how these concepts can be applied to solve non-trivial real life problems..

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Design & implement system programs as assembler, macro-processor, linker and loader
2. Implement scheduling algorithms for processes and threads.
3. Recognize processes synchronization, check deadlock and different ways to handle it.
4. Implement various memory management techniques.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	-	-	-	-	-	-	-	-	3	2	2
2	1	2	3	2	-	-	-	-	-	-	-	-	3	2	2
3	1	2	3	2	-	-	-	-	-	-	-	-	3	2	2
4	1	3	3	1	-	-	-	-	-	-	-	-	2	2	2

Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to system programming: Types of software and application software, system programming and system programs, need of system software. assemblers, loaders, compilers, interpreters, macros, operating system and formal system, translators and its types

Assemblers: Structure of assembler, basic function, machine dependent and machine independent features of assembler, types of assemblers – single pass, multi-pass, cross assembler. c. general design procedure of assembler, design of pass-I and pass-II assembler

Operating System Overview: Operating system objectives and functions, the evolution of operating systems, operating system services and components, separating system structures: monolithic, layered, kernel, microkernel, virtual machine.

Process: Concept of a process, process states, process description, process control (process creation, waiting for the process/processes, loading programs into processes and process

termination), and execution of the operating system. threads: processes and threads, concept of multithreading, types of threads. scheduling - types of scheduling, scheduling algorithms

Concurrency and Mutual Exclusion: Concurrency - process/thread synchronization and mutual exclusion principles of concurrency, requirements for mutual exclusion, mutual exclusion-hardware support, operating system support (semaphores and mutex), programming language support (monitors), classical synchronization problems readers/writers problem, producer and consumer problem.

Deadlock and Starvation: Principles of deadlock, deadlock prevention, deadlock avoidance, deadlock detection, an integrated deadlock strategy, example- dining philosophers problem

Memory Management: Memory partitioning: fixed and dynamic partitioning. memory allocation: allocation strategies (first fit, best fit and worst fit), fragmentation, swapping, paging and segmentation. virtual memory management: background, demand paging, page replacement (FIFO, LRU, optimal LRU), thrashing.

Storage Management: File organization, access methods and directory structure. allocation of disk space: contiguous allocation, non-contiguous allocation (chaining and indexing). disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

TEXT BOOKS:

1. Systems Programming, John J. Donovan, 1st edition, Tata McGraw-Hill, 1991, ISBN 0-07-460482-1.
2. Systems Programming and Operating Systems, D.M. Dhamdhere, 2nd Edition,Tata McGraw-Hill, ISBN:13:9780074630839.

REFERENCE BOOKS:

1. Operating Systems-A Concept-Based Approach, Dhananjay M. Dhamdhere, 3rd edition, TMH, 2012.
2. Modern Operating System, A. S. Tanenbaum, 2nd edition, Pearson publication", 2001.
3. Operating System Internals and Design Principles, William Stalling, 6th edition, Pearson Publication, 2013

CO253N DATABASE MANAGEMENT SYSTEM

Teaching Scheme: 03L + 00T, Total: 03 **Credit:**03
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ES **Total Marks:**10
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces the student Database Management System (DBMS), different data models, relational algebra concept, sql queries, Relational Database design theory and Transaction management and query optimization in DBMS. This course also introduces the Object Oriented databases and Database architecture. This course equips students with fundamental knowledge and basic technical competence in the field of DBMS.

COURSE OUTCOMES:

On the successful completion of this course student shall be able to;

1. Create a good database design.
2. Use relational databases.
3. Use and explain the E-R model and apply normalization for a given specification of the requirement.
4. Illustrate understanding of indexing methods.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		2		2	3	-	3	1	-	1	1	1	1	2	-
2				-	2	-	2	-	-	-		2	1	2	-
3	3		1	2		-		2	1	2		2	1	2	-
4	1	2	-	2		-				1		1	1	2	-

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to Conceptual Modeling:Basic concepts, Advantages of DBMS over file-processing systems, Data abstraction, Data models and data independence, Components of DBMS and overall structure of DBMS, Data modeling, Entity,Attributes, Relationships, Constraints, Keys E-R diagrams, Components of E-R Model,centralized and client/server architectures for dbms.

Relational Model:Basic concepts, Attributes and domains, Concept of integrity and referential constraints,Schema diagram. Relational query languages, Relational Algebra and Relational Calculus: Tuple relational and domain relational calculus.

Structured Query Language-: Introduction, Characteristics and advantages, Data types and literals, DDL Tables: creating, modifying, deleting, Views: creating, dropping, Updation using

views, DML, Operators,SQL DML queries, SELECT query and clauses., XML database.

Functional Dependencies and Normalization: Informal design guidelines for relational schemas, functional dependencies(FDs), Normal form based on primary keys, 2NF, 3NF, Boyce- Codd NF, properties of relational decomposition, algorithms for relational database schema design, multivalued dependencies and 4NF, join dependencies and 5NF,inclusion dependencies, other dependencies and NF.

Storage and File Systems: Secondary storage, File organization, Indices, Static and dynamic,hashing.

Query Processing and Transaction Management: Measures of query cost, Selection operation, Sorting and join operation, Transaction concept, Components of transaction management,Concurrency and recovery system, Different concurrency control protocols such as timestamps and locking, Validation, Multiple granularity, Deadlock handling, Different crash recovery methods such as log-based recovery, Shadow-paging, Buffer management and Remote backup system.

Introduction to: Cloud computing, data management, mobile databases, hadoop, sqlite database and sql- mongodb.

TEXT BOOKS:

1. Ramez Elmasri,Shamkant B Navathe, “Fundamentals of Database Systems”, 5th Edition,Pearson, 2008, ISBN- 9788131250.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, 5th Edition, McGraw-Hill, 2006, ISBN- 007-124476-X.

REFERENCE BOOKS:

1. R. Ramakrishnan, J. Gehrke, “Database Management Systems”, 2nd Edition, McGraw-Hill, 2000, .ISBN-13: 978-0072322064.

CO254NX SOFTWARE METRICS AND QUALITY ASSURANCE

Teaching Scheme: 02L + 00T, Total: 02 **Credit:** 02
Evaluation Scheme: 10ISA + 30MSE + 60ESE **Total Marks:** 100
Duration of ESE: 03 Hrs

Course Description:
This course introduces the students about the concepts of software measurement and metrics. It includes scope of software metrics, internal product attributes, and external product attributes Software quality and quality assurance techniques. This course also describes cost estimation, documentation and testing tools, etc.

Course Outcomes:
On the successful completion of this course, students shall be able to:
1. Select the basics of software measurement.
2. Estimate cost of software.
3. Choose the correct testing tools

CourseE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) , COURSE OUTCOMES (COS) AND PROGRAM SPECIFIC OUTCOMES (PSOS) , MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1	1	3	2	1	2	1	1	3	1	2	1	1
2	3	1	1	2	2	1	1	2	1	2	3	2	2	1	1
3	3	1	1	1	2	2	1	2	1	1	3	1	2	1	1

1- Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENTS:

Introduction to Software Measurement: measurement in everyday life, measurement in Software Engineering, the scope of software metrics, the representational theory of measurement, measurement and Models,measurement scales and scales types, meaningfulness in measurement, classifying software measures and determining what to measure.

Measuring internal product attributes: measuring internal product attributes: size,aspects of software size, length & reuse, functionality & complexity measuring internal product attributes: Structure, types of structural measures - control flow structures, modularity and information flow attributes & data structures, difficulties with general complexity measures.

Measuring external product attributes: software quality - modeling software quality & measuring aspects of quality, software reliability:basics of reliability theory, the software reliability problem, parametric reliability growth models, predictive accuracy, the importance of the operational environment

Cost estimation & Documentation: making Process Predictions - Good Estimates,cost estimationProblems and approaches,models of Effort and cost,software Documentation

Quality Assurance Techniques: quality assurance techniques- testing principles, goals, testing life cycle, phases of testing manual testing- test case design criteria, automated testing introduction of testing tools- Jmeter, Win Runner, QTP, selenium etc..ISO-9000 model, SEIís CMM Model, comparison of the ISO-9000 model with SEI‘s CMM model.

TEXT BOOKS:

1. Flanton, Pfleeger, ìSoftware Metrics- A Rigorous and Practical Approach Thompson Learning.
2. Mordechai Ben-menachem/Garry S.Marliss, ìSoftwareQuality, Thompson Learning.
3. Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672- 32798-8.

REFERENCE BOOKS:

1. Roger S. Pressman, ìSoftware Engineering- A PractitionerísApproach, TMH.
2. Paul C. Jorgensen, "Software Testing", IVth Edition, O'REILLY

CO254NY OPERATING SYSTEMS AND SYSTEMS PROGRAMMING

Teaching Scheme: 02+ 00T **Total:** 02 **Credits:**02
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course introduces the role of the operating system on the computer. It provides the knowledge of process, thread, scheduling algorithms and process synchronization and memory management concepts and demonstrates how these concepts can be applied to solve non-trivial real life problems..

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Design & implement system programs as assembler, macro-processor, linker and loader
2. Implement scheduling algorithms for processes and threads.
3. Recognize processes synchronization, check deadlock and different ways to handle it.
4. Implement various memory management techniques.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	-	-	-	-	-	-	-	-	3	2	2
2	1	2	3	2	-	-	-	-	-	-	-	-	3	2	2
3	1	2	3	2	-	-	-	-	-	-	-	-	3	2	2
4	1	3	3	1	-	-	-	-	-	-	-	-	2	2	2

Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to system programming: Types of software and application software, system programming and system programs, need of system software. assemblers, loaders, compilers, interpreters, macros, operating system and formal system, translators and its types

Operating System Overview: Operating system objectives and functions, the evolution of operating systems, operating system services and components, separating system structures: monolithic, layered, kernel, microkernel, virtual machine.

Process: Concept of a process, process states, process description, process control (process creation, waiting for the process/processes, loading programs into processes and process termination), and execution of the operating system. threads: processes and threads, concept of multithreading, types of threads. scheduling - types of scheduling, scheduling algorithms

Concurrency and Mutual Exclusion: Concurrency - process/thread synchronization and mutual exclusion principles of concurrency, requirements for mutual exclusion, mutual exclusion- hardware support, operating

system support (semaphores and mutex), programming language support (monitors), classical synchronization problems readers/writers problem, producer and consumer problem.

Deadlock and Starvation: Principles of deadlock, deadlock prevention, deadlock avoidance, deadlock detection, an integrated deadlock strategy, example- dining philosophers problem

Memory Management: Memory partitioning: fixed and dynamic partitioning. memory allocation: allocation strategies (first fit, best fit and worst fit), fragmentation, swapping, paging and segmentation. virtual memory management: background, demand paging, page replacement (FIFO, LRU, optimal LRU), thrashing.

TEXTBOOKS:

1. Systems Programming, John J. Donovan, 1st edition, Tata McGraw-Hill, 1991, ISBN 0-07-460482-1.
2. Systems Programming and Operating Systems, D.M. Dhamdhere, 2nd Edition,Tata McGraw-Hill, ISBN:13:9780074630839.

REFERENCE BOOKS:

1. Operating Systems-A Concept-Based Approach, Dhananjay M. Dhamdhere, 3rd edition, TMH, 2012.
2. Modern Operating System, A. S. Tanenbaum, 2nd edition, Pearson publication", 2001.
3. Operating System Internals and Design Principles, William Stalling, 6th edition, Pearson Publication, 2013

MDM

AIM255N FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Teaching Scheme: 02L + 00T, Total: 02 **Credit:** 02
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total Marks:** 100
Duration of ESE: 03 Hrs.

COURSE DESCRIPTION:

This course introduces the role of artificial Intelligence in computers. It provides the knowledge of AI applications, heuristics, Expert Systems, NLP, and Machine Learning techniques and demonstrates how these concepts can be applied to solve nontrivial real life problems.

COURSE OUTCOMES:

On the successful completion of this course student able to;

1. Understand the knowledge of AI applications, heuristics, Expert Systems, NLP, and Machine learning techniques
2. Communicate effectively about AI problems, algorithms, implementations, and their experimental evaluation.
3. Design intelligent agents for problem solving, reasoning, planning, and decision making.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) , COURSE OUTCOMES (COS) AND PROGRAM SPECIFIC OUTCOMES (PSOS) , MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2		-	-	-	-	-	1	-		1	1	1	1
2	1	-	3	-	2	-	-	-		1	3	1	2	1	1
3	1	2	3	-	-	-	-	2		1	3	1	2	1	2

1-Weakly correlated 2 – Moderately correlate 3 – Strongly correlated

COURSE CONTENTS:

Introduction: AI and intelligent agents. Basics of problem-solving: problem representation paradigms, state space, satisfiability vs optimality, pattern classification problems, example domains.

Search Techniques: Problem size, complexity, Solving Problems by Searching such as heuristic search techniques, stochastic search methods, and constraint satisfaction problems

Game Playing: minimax, Knowledge and Reasoning: Building a Knowledge Base, Propositional logic, first order Logic, situation calculus. Theorem Proving in First Order Logic , perception and action..

Knowledge Acquisition: Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks. Belief functions, certainty factors, and fuzzy sets.

Learning: Overview of different forms of learning, Learnability theory, Learning Decision Trees, Neural Networks, rule based.

Introduction to Natural Language Processing, AI languages and systems

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Prentice- Hall.
2. Artificial Intelligence: A New Synthesis, Nils J. Nilsson, Morgan-Kaufmann.
3.AI: Structures and Strategies for Complex problem solving, George F.Luger and William A. Stubblefield, 2nd edition, Benjamin Cummings Publishers, 1997.

REFERENCE BOOKS:

1. Introduction to Knowledge Systems, Mark Stefik, Morgan Kaufman, 1995.
2. Artificial Intelligence, Winston P.H., 3rd edition, Addison Wesley, 1995.
3. Artificial Intelligence, Shivshankar B Nair, E. Rich and K.Knight, Tata McGraw Hill, 1992.
4. Artificial Intelligence, E. Charniak and D. McDermott, Addison Wesley, 1987.

MDM

CPM255N FUNDAMENTALS OF DATA STRUCTURES

Teaching Scheme: 02L+ 00T Total: 02 **Credits: 02**

Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks: 100**

ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course introduces to students about data structure, how to allocate data in memory. To introduce various techniques for representation of the data in the real world.

COURSE OUTCOMES:

On the successful completion of this course, students shall be able to:

1. Explain the concepts and operations of various linked lists (singly, doubly, and circular) and apply these structures to implement linear data structures such as stacks and queues, as well as polynomial manipulations.
2. Differentiate between linear and non-linear data structures and analyze tree structures, including binary trees, binary search trees, and threaded binary trees.
3. Apply graph theory concepts to represent graphs using adjacency matrices and lists, and evaluate traversal algorithms such as depth-first search (DFS) and breadth-first search (BFS).
4. Design and implement symbol tables using AVL trees and heaps, and apply hashing techniques to create efficient hash tables.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	3	1	-	-	2	-	-	-	-	-	1	-	3
2	1	2	3	1	-	-	2		-	-	-	-	1	-	3
3	1	2	3	2	-		2	-	-	-	-	-	1	-	3
4	1	-	3	2	-	-	2	-	-	-	-	-	1	-	3

1- Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS

Introduction to Data Structures and Algorithm Analysis: Concept of data, data object, data structure, abstract data types (ADT), concept of primitive and non - primitive, linear and nonlinear, static and dynamic, persistent and ephemeral data structures, functions, structure and pointer. Space and time complexity,Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω,Theta), Problems on time complexity calculation.

Array as a Data Structure : ADT of array, Operations,Array applications - Searching ,Sequential search,Binary Search,Sentinel search , Probability search, ordered list search

Stack: Basic concept, stack Abstract Data Type, Representation of Stacks Using Sequential Organization,stack operations, Multiple Stacks,Applications of Stack- Expression Evaluation and Conversion, Polish notation and expression conversion, Need for prefix and postfix expressions, Postfix expression evaluation,recursion concept, variants of recursion- direct, indirect

Queue: Basic concept, Queue as Abstract Data Type, Representation of Queue using Sequential organization,Queue Operations, Circular Queue and its advantages, Multi-queues,Linked Queue and Operations.

Linked List: Single Link List, Double Linked List

Tree : Tree terminology-Binary Tree,full binary tree,complete binary tree,Binary Search Tree,Tree traversal techniques,Implementation and Operations on Binary Search Tree - Create, Insert, Delete, Search,Tree traversals– preorder, inorder, postorder (recursive implementation)

TEXT BOOKS:

1. Data Structures,Seymour Lipschutz, Schaum's Outlines Tata McGraw Hill, 2006.
2. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Galgotia Publication.

REFERENCE BOOKS:

1. Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN-0-201-43578-0
2. Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
3. File organization and processing, A. Tharp ,2008 ,Wiley India edition ,9788126518685
4. An introduction to data structures with Applications, J. Tremblay, P. Soresan, 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
5. ADTs' Data Structures and Problems with C++, Larry Nyhoff,Pearson Publications.

MDM

DTM255N Drone Electronics

Teaching Scheme: 02L+ 00T Total: 02 **Credits:** 02

Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100

ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course provides the knowledge of fundamental aspects for designing circuits of drones. The course also introduces various electronics components and devices used in manufacturing drones. The course outlines the basic concepts and principles of batteries, Motors, electronics , electrical components, various communication devices, sensors , microcontrollers and controllers used in construction of drones circuits.

COURSE OUTCOMES

On the successful completion of this course, students shall be able to:

1. Explain basic electronics principles and components used in construction of drones.
2. Describe the working of motors that can be used in UAV.
3. Explain various interfaces used in drone circuits.
4. Identify different types of sensors, ports and connectors used in drone circuits.
5. Classify different microcontrollers and flight controllers.
6. Use programming languages concepts in drone programming.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	1	9	10	11	12	1	2	3
1	1	2	3	1	-	-	2	-	-	-	-	-	1	-	3
2	1	2	3	1	-	-	2		-	-	-	-	1	-	3
3	1	2	3	2	-		2	-	-	-	-	-	1	-	3
4	1	-	3	2	-	-	2	-	-	-	-	-	1	-	3
5	1		2	2		3	2		3	2	5			2	3
6	1		3	3										2	3

1. **Weakly correlated 2 – Moderately correlated 3 – Strongly correlated**

COURSE CONTENTS

Battery and its management (04 Hours)
Introduction to common electronic components used in drone circuit, Description of Li-Po Battery, Charging / Discharging of Battery. Back up, Ratings, Shelf Life, Maintenance and safety of Battery. Selection criteria of Battery for Drone application.

Motors (04 Hours)
Difference between AC and DC motors and stepper motor, Brushed and Brushless motors, brief idea of motor capabilities for a drone build, Selection criterion of motor for drone application. Working and application of BLDC motor.

Sensors (04 Hours)
Wi-fi devices, RADAR and range finder, GPS receiver, Gyro sensor, Speed and Distance sensor, Image sensor, TOF sensor, Chemical sensor. Cameras in drones and selection criteria of cameras for different ranges. Barometers, Accelerometer, Magnetometer, remote control for drones.

Radio Control System (06 Hours)
Introduction of radio control system, Controllers, Transmitter and Receiver, Flight Controllers, Electronic Speed Controller, SIMONK & BLHelifirmware software ,Battery Eliminator Circuit, Universal Battery Eliminator Circuit , OPTO Coupler.

Connections and Interfaces of Devices in Drone (04 Hours)
Brief introduction of RS232, RS422, RS485, UART ports. Different types of connectors and their specifications. Microcontroller interfacing techniques.

Introduction to Drone Programming (04 Hours)
Introduction to programming languages used in drones : C and Python. Auto Pilot software i.e. Ardupilot, Openpilot.

INSTRUCTIONAL STRATEGY: -Teacher should merely focus on the important electronics components and devices used in manufacturing of drones.

TEXT BOOKS :-

1. Robert L. Boylestad / Louis Nashelsky “Electronic Devices and Circuit Theory, Latest Edition, Pearson Education.
2. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill.
3. J. B. Gupta, Basic Electrical Engineering, Kataria& Sons.
4. H.S .Kalsi, Electronic Instrumentation, Latest Edition, TMH Publication.

REFERENCE BOOKS:-

1. Behavior of Lithium-Ion Batteries in Electric Vehicles: Battery Health, Performance, Safety, and Cost (Green Energy and Technology) by Gianfranco Pistoia, Boryann Liaw , Springer.
2. An Introduction to Analog and Digital Communication by Simon Haykin, Wiley Student Edition.
3. Electronics Communication System by Kennedy, Tata McGraw Hill Education Pvt Ltd, New Delhi.
4. Wireless Communications | Second Edition | By Pearson: Principles and Practice.
5. Programmable Microcontrollers With Applications (Cem Unsalan, H. Deniz Gurhan)
6. Drone Technology in Architecture, Engineering and Construction (, Tal Daniel

MDM

DCM255N Cyber Laws and Cyber Security Principles

Teaching Scheme: 02L+ 00T Total: 02 **Credits: 02**

Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks: 100**

ESE Duration: 3Hrs.

COURSE DESCRIPTION:

This course provides an in-depth understanding of cyber laws and cybersecurity principles, focusing on legal frameworks, intellectual property rights, and risk management. Through case studies and real-world applications, students will learn to analyze, interpret, and apply cyber laws while ensuring ethical practices and compliance in digital environments.

COURSE OUTCOMES

On the successful completion of this course, students shall be able to:

1. Understand and interpret various cyber laws and their implications on cybersecurity practices and policies.

2. Analyze the legal frameworks governing data protection, privacy, and intellectual property rights in the digital environment.

3. Assess the principles of cyber security, including risk management, threat detection, and incident response strategies.

4. Apply cyber laws and cybersecurity principles to case studies and real-world scenarios, demonstrating compliance and ethical considerations.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) , COURSE OUTCOMES (COS) AND PROGRAM SPECIFIC OUTCOMES (PSOS) , MAPPING WITH STRENGTH OF CORRELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2		-	-	-	-	-	1	-		1	1	1	1
2	1	-	3	-	2	-	-	-		1	3	1	2	1	1
3	1	2	3	-	-	-	-	2		1	3	1	2	1	2
4	1	2	3	-	-	-	-	2		1	3	1	2	1	2

1-Weakly correlated **2 – Moderately correlate** **3 – Strongly correlated**

COURSE CONTENTS

Overview of Cyber Laws: Definition and importance of cyber laws, Evolution of cyber laws globally and in specific regions (e.g., India, USA, EU), Information Technology Act, 2000 (India) and amendments, General Data Protection Regulation (GDPR) (EU), Cybersecurity Information Sharing Act (CISA) (USA), Types of cybercrimes (hacking, phishing, identity theft, etc.), Legal consequences of cybercrimes, Jurisdictional issues in cyberspace.

Intellectual Property Rights in Cyberspace: Introduction to Intellectual Property (IP) in Cyberspace, Copyrights, trademarks, and patents in the digital age, Protection of digital content and software**.**Cyber Piracy and Digital Rights Management: Issues and challenges in protecting IP online, Case studies on digital piracy and enforcement of IP rights. Domain Name Disputes: Cybersquatting and dispute resolution mechanisms, Uniform Domain-Name Dispute-Resolution Policy (UDRP).

Principles of Cyber Security: Fundamentals of Cyber Security: Understanding cyber threats, vulnerabilities, and attacks, Key principles: Confidentiality, Integrity, and Availability (CIA Triad).

Cybersecurity Frameworks and Standards: NIST Cybersecurity Framework, ISO/IEC 27001, Best practices for implementing cybersecurity measures. Risk Management: Identifying and assessing cybersecurity risks, Strategies for risk mitigation and incident response.

Case Studies and Ethical Considerations: Analyzing Cybersecurity Incidents: Case studies on major cybersecurity breaches (e.g., Equifax, WannaCry). Lessons learned and legal implications. Ethical Hacking and Penetration Testing: Role of ethical hackers in strengthening cybersecurity. Legal and ethical considerations in penetration testing. Compliance and Governance: Ensuring compliance with cyber laws and regulations. Building a culture of cybersecurity within organizations.

TEXT BOOKS:

1. Cyberlaw: The Law of the Internet and Information Technology by Brian Craig
2. Cyber Law: Text and Cases by B. M. Gairola and S. K. Bhatia
3. Cybersecurity Law by Jeff Kosseff
4. Global Privacy Protection: The First Generation by Paul Lambert
5. Cyber Crime and Cyber Security: Legal and Ethical Issues by David L. Thaw

REFERENCE BOOKS:

1. Intellectual Property and the Internet: A Practical Guide by Philip Leith
2. Digital Copyright: Law and Practice by Jessica Litman
3. Intellectual Property Law for Engineers and Scientists by Howard B. Rockman
4. Intellectual Property and Digital Rights Management by Robert E. McGuire
5. Information Security Governance: A Practical Development and Implementation Approach by Krag Brotby

CO256N OPERATING SYSTEMS AND SYSTEMS PROGRAMMING LAB

Teaching Scheme: 02P; Total: 02 **Credit**:01
Evaluation Scheme: 30 ICA , 20 ESE **Total Marks:** 50

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO252N. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A:

1. Implementation of Pass-I Two Pass assembler with hypothetical Instruction set.
2. Implementation of Pass-II Two Pass assembler with hypothetical Instruction set.
3. Exploring various features of debug command.
4. Write C programs to simulate UNIX commands like ls, grep, etc
5. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
6. To implement Deadlock Avoidance and Deadlock Detection Algorithms

Group B:

1. To write a C program for Dining Philosophers Program
2. Implement Memory management schemes like First fit, Best fit and Worst fit.
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
5. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU
6. Implementation of the following File Allocation Strategies

TEXT BOOKS:

1. Systems Programming,John J. Donovan, 1st edition, Tata McGraw-Hill, 1991, ISBN 0- 07-460482-1.
2. Systems Programming and Operating Systems,D.M. Dhamdhere, 2nd Edition,Tata McGraw-Hill, ISBN:13:9780074630839.
3. Operating System Internals and Design Principles,William Stalling, 6th edition, Pearson Publication, 2013.

REFERENCE BOOKS:

1. Operating Systems-A Concept-Based Approach, Dhananjay M. Dhamdhere, 3rd edition, TMH, 2012.
2. Modern Operating System, A.S. Tanenbaum, , 2nd edition, Pearson publication", 2001.

NOTE:

ICA – Internal Continuous Assessment shall support regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and the record submitted by the student (journal) based on practical performance by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

CO257N DATABASE MANAGEMENT SYSTEM LAB

Teaching Scheme: 02P Total:02 **Credit:** 01

Evaluation Scheme: 30 ICA + 25ESE **Total Marks:** 50

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO253N. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, commands/sql statements/ clauses used for Querying database and printout of queries with proper comment and output.

Group A:

1. Map the ER/EER diagrams to a relational schema. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints. Create a database of the same schema using Data Definition Language(DDL). Use all DDL statements(Create, Alter, Drop) with all possible options and constraints(Primary key, Foreign Key, unique, Not Null, Default, Check etc.).
2. Design at least 10 SQL queries for suitable database application using SQL DML statements to retrieve, insert, delete and update data and queries which involves DML Features like Set Operation,Set Comparisons, Aggregation, group by, having, order by,queries to demonstrate Transaction control language(TCL): commit, savepoint, Rollback and Data Control Language (DCL): GrantRevoke.
3. SQL queries to demonstrate View,Triggers andIndexing.
4. SQL queries to:
   a. create and use sequences.
   b. demonstrate Stored Procedure and stored functions.
5. Perform DML and DLL usingPL/SQL.
6. Write SQL for implementing Nested Queries.
7. Program to Perform DML and DDL using all possible SQL commands and with the help any one host languages like C, C++ etc (i.e. embeddedSQL).

Group B

1. Install MongoDB, run MongoDB on your OS and set up a python environment with MongoDB.
2. Connect to MongoDB with python, get a Database Handle . Create a collection and insert a document
3. Perform following operations on a collection:
   a. Retrieve all documents in a collection which matches certain property.
   b. Perform queries that uses MongoDB query operators (minimum six)
4. Perform Queries that read, count and sort documents in a collection.
5. Perform following operations on a collection:
   a. Update the document in a collection(use MongoDB update modifiers).
   b. Delete documents from a collection
6. Demonstrate following MongoDB and python patterns.
   a. Embedding
   b. Fast Accounting pattern
7. Design a simple web application using MongoDB as a backend.
8. Mini- Project which includes all RDBMSconcepts.

TEXT BOOKS:

1. by Dr. P. S. Deshpande, SQL and PL/SQL for Oracle 11g Black Book, DreamTech, 2011, ISBN-9788177229400.
2. Niall O, MongoDB ,‟Higgins, SPD O‟ReillyPublications.

REFERENCE BOOKS:

1. Kevin Loney, George Koch, Oracle 9i/10g The Complete Reference, Tata McGrawHill.
2. SQL Server – Black Book by Dalton Patrik, 1st Edition, DreamTech Press, 2007, ISBN-8 817722722X.
3. Ivan Bayross, SQL, PL/SQL: The Programming Language of Oracle, 3rd Revised Edition, BPB Publication ISBN-817656964-X.
4. Reese G., Yarger R., King T, Managing and Using MySQL, Williums H, 2ndEdition, Shroff Publishers and Distributors Pvt. Ltd., ISBN 81 - 7366 - 465 –X.

NOTE:

ICA–Internal Continuous Assessment shall support regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by a student (journal) based on practical performance by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S10).

ESE–The End Semester Examination (PRESE) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO258N SOFTWARE LAB-I

Teaching Scheme: 02P; Total: 02 **Credit**:01
Evaluation Scheme: 30 ICA+20 ESE **Total Marks:**50
Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO258N. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. The concerned faculty member must conduct group-A contents in theory lectures and in the first few practical turns.

Contents:

Django-

Introduction to Django,Getting started,The Basics of the dynamic web Pages,The Django Template system,Interacting with a database:models, The Django Administration sites,form Processing,Advanced Views and URLconfs.

Group-A:

1. Installation of Django framework.
2. Create a simple “Hello World” page using the django framework.
3. Design a django project for email sender
4. Design a django project for text-to-HTML converter
5. Design a django project for chat Application
6. Design a django project for Dictionary Application
7. Design a django project for Notes Applications
8. Design a django project for Django Blog
9. Design a django project for Ecommerce Store
10. Design a django project for Video Calling App
11. Design a django project for Social Networking App

Group-B:

1. Design a django project for Django CMS
2. Design a django project for News App
3. Design a django project for Login System
4. Design a django project for Weather App
5. Design a django project for Calorie Counter App
6. Design a django project for Online School System
7. Design a django project for Library Management System
8. Design a django project for Railway Enquiry System
9. Design a django project for Quiz App

TEXT BOOKS:

1. Adrian Holovaty and Jocab Kaplan-Moss, “The Definitive Guide to Django: Web Development Done Right” Apress Publication,2008

NOTE:

ICA – Internal Continuous Assessment shall support regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by a student (journal/online submission) based on practical performance by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PRESE) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

SH202N: ENTREPRENEURSHIP DEVELOPMENT

Teaching Scheme:02 L Total:-02 **Credit:**02
Evaluation Scheme:10 ISA +30 MSE +60ESE **Total Marks:**100
MSE Duration: 1.5 Hrs **ESE Duration:** 3.0 Hrs.

COURSE DESCRIPTION

Entrepreneurship Development is a dynamic course designed to equip students with the knowledge, skills, and mindset essential for success in entrepreneurial endeavors. The course focuses on awareness of entrepreneurs and its different aspects. This course will cover details about design thinking, Entrepreneurial Behavior and Innovation Function, small-scale enterprises, family business and rural entrepreneurship as well as recent trends. It gives an overview of entrepreneurship.

COURSE OUTCOMES

On successful completion of this course the students will be able to

1. Apply the concept and knowledge of entrepreneurship
2. Utilize the concept of entrepreneurial behavior as well as innovation
3. Prepare project report to start own enterprise
4. Develop the ability to start small scale business
5. Run and enhance their own family business, develop rural entrepreneurship and Utilize recent trends in entrepreneurship

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO- RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	3	2	2	2	2	2	3			3
2	-	-	-	-	-	3	2	2	2	2	2	3			3
3	-	-	-	-	-	3	2	2	2	2	2	3			3
4	-	-	-	-	-	3	2	2	2	2	2	3			3
5	-	-	-	-	-	3	2	2	2	2	2	3			3

1-Weakly Correlated 2-Moderately Correlated 3 -Strongly correlated

CONTENTS:

Entrepreneur and Entrepreneurship:

Entrepreneur, entrepreneur and enterprise, entrepreneurs and managers, traits of a true entrepreneur, characteristics of a successful entrepreneur, classification and functions of an entrepreneur, problems faced by entrepreneurs, Concepts of entrepreneurship, importance, myths, barriers, stages in the entrepreneurial process, socio-economic origins of entrepreneurship, environmental factors affecting entrepreneurship, entrepreneurship in economic

growth:-definition, relationship between entrepreneur and entrepreneurship, Nature and characteristics of entrepreneurship, role of entrepreneurship in economic growth, Concepts-Sociopreneur, Edupreneur, Ecopreneur, Netpreneur, Intrapreneur (Only concept and Characteristics)

Entrepreneurial Behavior and Innovation Function: Innovation and Entrepreneur, Schumpeter's and Ducker's theories, Entrepreneurial Behavior and Psychological Theories:Maslow's need hierarchy theory, McClelland's Need Achievement Theory, Knight's Risk Taking theory, Social Responsibility, **Innovation Function**: Concept, Characteristics, Sources, Types, Levels, and Evolution of innovation management, Effective innovation management, Performance evaluation.

Design Thinking, EDP and Projects:

Design Thinking – Basics, Principles, Process, Personality Profile of Design Thinker,Design Thinking Cultures, Ten Tools for Design Thinking, Creating Ideal conditions for design thinking.
EDP - Concept, Phases, Importance, Objectives,Success of EDP, Shortcomings of EDP, Project - Identification, Classification,internal and external constraints,project objectives

Small Business Enterprise and sickness in small business enterprises:

Business idea- Sources, selection, concepts and Business opportunities in various sectors, Identifying the business opportunity,Steps for starting of business, Definitions of SSI, Formalities for setting up of a small business enterprise, Environment pollution related clearances, Project report guidelines, Procedures and formalities for registration, Problems for small-scale industries. Definition of sickness and status of sickness of SSI in India, Criteria to identify sickness/incipient sickness, Causes for sickness/incipient sickness in SSI, Symptoms of sickness, Cures for SSI sickness, Institutions supporting small business enterprises: introduction, Central level institutions, State level institutions, Other agencies, Industry associations.

Family Business and Rural Entrepreneurship:

Family business - Importance, Types, Succession, Management development plan and precautions Meaning and Needs of Rural Entrepreneurs, Rural Industrialization in Retrospect, Problems of Rural Entrepreneurship and Step to Develop Rural Entrepreneurship, Advantages and Major Challenges to Develop Rural Entrepreneurship, Recommendations to Boost up Rural Entrepreneurship, Recent Trends- Start up, Stand up, Skill India, Make in India, Incubation Centre-Concept and Importance.

TEXT BOOKS:

1. Entrepreneurship Development Small Business Enterprises, Poornima Charantimath, Pearson, 1st edition Reprint, 2005.
2. Entrepreneurial Development, C.B.Gupta, Srinivasan N.P., Sultan Chand and Sons Publications, 5thedition, 2008.
3. DynamicsofEntrepreneurshipDevelopmentandManagement,VasantDesai, Himalaya, 1st edition, 2009.

4. EntrepreneurshipDevelopment,Dr.S.Senthil,Suchitra Publications
5. Entrepreneurship Development–Lall & Sahai: Excel Books
6. Entrepreneurial Development by Dr. S.S Khanka, S Chand & Company, 2011 edition

REFERENCE BOOKS:

1. Entrepreneurship, Robert D.Hisrich, Michal P. Peters, Tata McGraw-Hill,7th Edition, Jan 1, 2007.
2. Patterns of Entrepreneurship, Jack M. Kaplan, Willey Publications, 4th edition, 2013.
3. Entrepreneurship Development and Project Management, Neeta Baporikar, Himalaya, 2nd edition, 2011.
4. Entrepreneurship Development, Cynthia L.Greene,CengageLearning,4th edition, 2008.

SH204N: UNIVERSAL HUMAN VALUES- II

Teaching Scheme: 02L per week Total: 02 **Credits: 02**
Evaluation Scheme: 30 MSE + 70 ISA **Total Marks: 100**
MSE Duration: 1.5 Hours **ESE Duration: 3:00 Hrs.**

COURSE DESCRIPTION:

The course is intended to provide a universally adaptable, systematic and rational study of the human being vis-à-vis the rest of existence. It is free from any dogma or value prescriptions. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with and within the student himself/herself finally.

DESIRABLE AWARENESS/SKILLS:

Fundamental knowledge of universal human values and ethics.

COURSE OUTCOMES:

On the successful completion of this course students shall be able to

1. Create awareness on Engineering Ethics and Human Values.
2. Describe the social responsibility of an engineer.
3. Appreciate ethical dilemmas while discharging duties in professional life.
4. Develop Faculty-student or mentor-mentee programs throughout their time with the institution

RELEVANCE OF COURSE OUTCOMES [COS] WITH POS AND PSOS [WITH STRENGTH OF CORRELATION]:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	3	2	-	-	-	-	-	-	-	3
2	-	-	-	-	-	3	2	-	-	-	-	-	-	-	3
3	-	-	-	-	-	3	2	-	-	-	-	-	-	-	3
4	-	-	-	-	-	3	2	-	-	-	-	-	-	-	3

1-Weakly correlated **2 –Moderately correlated** **3–Strongly correlated**

COURSE CONTENT

Exploring aspirations and concerns (basic human aspirations): (05 Hrs.)
Value Education, Definition, Concept and Need for Value Education, The Content and Process of Value Education, Basic Guidelines for Value Education, Self exploration as a means of Value Education, Happiness and Prosperity as parts of Value Education.

Harmony in the Human Being (05 Hrs.)
Human Being is more than just the Body, Harmony of the Self ('I') with the Body, Understanding Myself as Co-existence of the Self and the Body**,**Understanding Needs of the Self and the needs of the Body, Understanding the activities in the Self and the activities in the Body.

Harmony in the Family and Society and Harmony in Nature (05 Hrs.)
Family as a basic unit of Human Interaction and Values in Relationships, The Basics for Respect and today's Crisis: Affection, Guidance, Reverence, Glory, Gratitude and Love, Comprehensive Human Goal: The Five Dimensions of Human Endeavour, Harmony in Nature: The Four Orders in Nature, The Holistic Perception of Harmony in Existence.

Social Ethics (05 Hrs.)
The Basics for Ethical Human Conduct, Defects in Ethical Human Conduct, Holistic Alternative and Universal Order, Universal Human Order and Ethical Conduct, Human Rights violation and Social Disparities

Professional Ethics (5 Hrs.)
Value based Life and Profession, Professional Ethics and Right Understanding, Competence in Professional Ethics, Issues in Professional Ethics -The Current Scenario, Vision for Holistic Technologies, Production System and Management Models

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010A.N Tripathy, New Age International Publishers, 2003.
2. A.N Tripathy, New Age International Publishers, 2003.
3. Bajpai. B. L.New Royal Book Co, Lucknow, Reprinted, 2004
4. Bertrand Russell Human Society in Ethics & Politics

REFERENCE BOOKS:

1. Corliss Lamont, Philosophy of Humanism
2. Gaur. R.R., Sangal. R, Bagaria. G.PA Foundation Course in Value Education,
3. I.C. Sharma Ethical Philosophy of India Nagin & co Julundhar
4. Mortimer. J. Adler, – Whatman has made of man
5. William Lilly Introduction to Ethic Allied Publisher

SH205N: मराठी लेखन कौशल्य **(Marathi Writing Skills)**

एकूण तासिका : ०२ तास प्रति आठवडे शैक्षणिक जमा गुणसंख्या **(Credits) :**०२
मध्य सत्र परीक्षा : ३० गुण; अंतर्गत मुल्यांकन : २० गुण एकूण: ५० गुण
मध्यसत्र परीक्षा कालावधी:१.५तास

उद्दिष्टे:

- प्रभावी लेखनकौशल्य विकसित करणे.
- व्यावसायिक व शैक्षणिक उद्देशांसाठी विविध लेखनतंत्रांची समज व उपयोग करणे.
- मराठी साहित्याची महत्ता व तांत्रिक शिक्षणातील त्याचे महत्त्व समजून घेणे.
- स्पष्ट आणि संक्षिप्त लेखनशैली विकसितकरणे.
- तांत्रिक व व्यावसायिक संवाद कौशल्य विकसित करणे.
- विविध प्रकारच्या तांत्रिक दस्तऐवजीकरणासाठी मानके आणि प्रारूप शिकविणे.

घटक विश्लेषण:

मराठी भाषाआणि लेखनाचीओळख **(०२ तास)**

तांत्रिक शिक्षणात मराठीचे महत्त्व,मराठी व्याकरण (वाक्यरचना) संक्षिप्त परिचय,मूलभूत वाक्यरचनाआणि वापर.

लेखन कौशल्य विकास **(०४ तास)**

लेखनाचे प्रकार: वर्णनात्मक, कथात्मक, विवरणात्मक, आणि पटवून देणारे लेखन,प्रभावी लेखनतंत्रे,स्पष्टआणि संक्षिप्त लेखनशैली विकसित करणे.

व्यावसायिकआणितांत्रिकलेखन **(०४ तास)**

अधिकृतपत्रे, ईमेल्स आणि अहवालांचे लेखन,तांत्रिक दस्तऐवज आणि मार्गदर्शक तयार करणे,प्रकल्प प्रस्तावआणि संक्षिप्त सारांशलेखन.

सृजनशील लेखन **(०२ तास)**

कथालेखन आणि निबंधलेखन, कविता आणि तिचे प्रकार,माध्यमांसाठी लेखन: लेख, ब्लॉग्स, आणि स्तंभलेखन.

प्रस्तुतीकरण, संवाद आणि सारांशलेखन कौशल्य: **(०६ तास)**

मराठीत प्रस्तुतीकरण तयार करणे,सार्वजनिक बोलणे आणि मौखिक संवाद कौशल्य,मराठीत सेमिनारआणि गटचर्चाआयोजित करणे.वाचनाच्या प्रमुखअंगांचे संक्षेपीकरण,पाठ्यपुस्तकांचे संक्षेपीकरण आणि सारांश.

पत्रलेखनाचे नियम, तत्त्व,प्रकार: **(०४ तास)**

पत्रलेखनात अनुसरण करण्याचे सर्वोत्तम नियम,अभिप्राय व्यक्तकरण्याचे तंत्र. पत्रलेखनाचे बाबीचे मूलसिद्धांत,पत्रलेखनाचे प्रकार: अनौपचारिक, औपचारिक, व्यावसायिक. व्यक्तिगतपत्र (आधिकारिक, अआधिकारिक),व्यावसायिकपत्र (निवेदन, विवादपत्र, मागणीपत्र, तक्रारपत्र),

अनौपचारिक पत्र (आभारपत्र, निमंत्रणपत्र)

निबंध लेखनाचे मूलसिद्धांत, प्रकार, उपयोगी तंत्रे:**(०४ तास)**

निबंध लेखन बाबीचे मूलसिद्धांत आणि नियम, सामाजिक, राजकीय, वैज्ञानिक, सांस्कृतिक, कल्याणकारी विषयांवर निबंधलेखन,निबंधाच्या लेखनात संप्रेषण करण्याचे तंत्र.

अभ्यासक्रमाचे परिणाम:

1. तांत्रिक संकल्पनांचे स्पष्ट आणि प्रभावी लेखन क्षमता विकसित करणे.
2. व्यावसायिक संदर्भात सुसंवाद आणि प्रभावी प्रस्तुती करणाची क्षमता विकसित करणे.
3. विविध प्रकारच्या तांत्रिक दस्तऐवज स्वतंत्रपणे तयार करणे.

4. सर्जनशील विचारांच्या माध्यमातून आकर्षक आणि मनोरंजक साहित्य निर्मिती करणे.
5. मराठीत प्रभावी सार्वजनिक बोलणेआणि प्रस्तुतीकरण कौशल्य विकसित करणे.

RELEVANCE OF COURSE OUTCOMES [COS] WITH POS AND PSOS [WITH STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	2	1	2	-	-	3
2	-	-	-	-	-	2	2	1	2	-	-	3
3	-	-	-	-	-	2	2	1	2	-	-	3
4	-	-	-	-	-	2	2	1	2	-	-	3
5	-	-	-	-	-	2	2	1	2	-	-	3

1-Weakly correlated 2 –Moderately correlated 3–Strongly correlated

संदर्भपुस्तके:

1. "सारांश आणि संक्षेपणकला" – मीना देशपांडे
2. "मराठी सारांशलेखन कौशल्य" – विजय देशमुख
3. "सर्जनशील लेखनाचे मार्ग" – शिवाजीसावंत
4. "लेखनप्रेरणाआणि तंत्र" – अनुपमानिरंजन
5. "व्यावसायिक आणि तांत्रिकलेखनाची कला" – कृष्णास्वामी
6. उत्कृष्ट मराठी निबंध" - संकलन, लोकवाङ्मयगृह
7. "मराठी निबंधलेखन कौशल्य" - प्रो. सुधाकर पाटील
8. "मराठी विचारमंच" – विश्वास प्रकाशन

वर्गातील कमीत कमी उपस्थिती ७५% असणे अनिवार्य असेल अन्यथा गुणांकन केले जाणार नाही.

मध्य सत्र परीक्षेचा अभ्यासक्रम हा एकुण अभ्यासक्रमाच्या ५० टक्के असेल.

तांत्रिक संकल्पनांची स्पष्ट आणि प्रभावी लेखन क्षमता	व्यावसायिक संदर्भात सुसंवादआणि प्रभावी प्रस्तुती करणाची क्षमता	विविध प्रकारच्या तांत्रिक दस्तऐवज स्वतंत्रपणे तयार करण्याची क्षमता.	सर्जनशील विचारांच्या माध्यमातूनआकर्षकआणि मनोरंजक साहित्य निर्मिती करण्याची क्षमता	मराठीत प्रभावी सार्वजनिक बोलणेआणि प्रस्तुतीकरण कौशल्य विकसित करण्याची क्षमता
०४	०४	०४	०४	०४