



Shri Sumanoo Potti (Yadavankar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

Yadav (Chhalkaranji)-416121, Dist. – Kolhapur

Teaching and Evaluation Scheme for SY B. Tech.

Department of Artificial Intelligence & Data Science

Engineering

NEP Structure

(2023-24)

Semester: III



Head of Department,

Artificial Intelligence & Data Science

SHARAD INSTITUTE OF TECHNOLOGY

COLLEGE OF ENGINEERING,

Yadav (Chhalkaranji) Dist. Kolhapur.



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Yadav (Chhalkaranji)-416121, Dist. – Kolhapur

Department: AI&DS

Class: S.Y. B.Tech.

Rev: Course Structure/01/NEP/2023-24

Semester: III

Sr No	Course Code	Course Type	Course	Teaching Scheme			Evaluation Scheme					Credits	
				L	T	P	Total Hrs.	CA1	CA2	MSE	RSE		Total
1	23AD2301	PCC	Linear algebra and Probability	3	-	-	3	10	10	30	50	100	3
2	23AD2302	PCC	Data Structure	3	-	-	3	10	10	30	50	100	3
3	23AD2303	PCC	Database Technologies	3	-	-	3	10	10	30	50	100	3
4	23AD2304	PCC	Data Structure Laboratory	-	-	2	2	15	15	-	20	50	1
5	23AD2305	PCC	Database Technologies Laboratory	-	-	2	2	15	15	-	20	50	1
6	23AD2306	EEM	Software Engineering and Management	2	-	-	2	25	25	-	-	50	2
7	23AD2307	VEC	Environmental Sciences	2	-	-	2	25	25	-	-	50	2
8	23AD2308	CEP	Mini Project - II	-	-	2	2	25	25	-	-	50	1
9	23ADMDXX	MIDM	Multidisciplinary Minor-1	2	-	-	2	10	10	30	50	100	2
10	23OEAAD21	OE	Open Elective I*	2	-	-	2	10	10	30	50	100	2
11	23HSSM01	VEC	Aptitude Skills-I	1	-	-	1	25	25	-	-	50	1
12	23HSSM02	VEC	Language Skills-I	-	-	2	2	25	25	-	-	50	1
Total				18	-	08	26	205	205	150	290	850	22

**Basket of Multidisciplinary Minor-1**

Basket 1 Finance & Management (23ADMDDAI)	Basket 2 Health Sciences Introduction to Healthcare System (23ADMDB1)	Basket 3 Management & Entrepreneur Development Entrepreneurship (23ADMDC1)
Fundamentals of Finance and Management	Introduction to Healthcare System	Entrepreneurship Development

\* Indicates Open Elective course will be offered to students of other programs and will not be offered to students of the same program



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**Linear Algebra and Probability**

23AD2301	PCC	Linear Algebra and Probability	3-0-0	3 Credits
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<b>Teaching Scheme</b>	<b>Examination Scheme</b>
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** HSC Mathematics

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

CO1	Determine whether a given structure is vector space, subspace structure, determine basis and dimension of vector space
CO2	Solve algebra of linear transformations, convert a given linear transformation into matrix form.
CO3	Find the Orthogonalization in inner product space, apply diagonalization to find powers of matrices.
CO4	Illustrate and formulate fundamental probability distribution and density functions, as well as functions of random variable.
CO5	Apply different methods to find the correlation between the variables. Develop basic mathematical tools for regression analysis.
CO6	Apply various statistical tests to test the hypothesis.

**Course Contents:**

<b>Unit 1: Vector spaces</b> The n-dimensional vectors, Vector space, Subspace, Linear dependance & independence of vectors, Basis and dimension.	[6]
<b>Unit 2: Linear transformations</b> Definition, algebra of linear transformations, Inverse of a Linear transformation, Composition of a linear Transformation, Range and Kernel, Rank and nullity, Rank-Nullity theorem, Matrix representation of a linear transformation	[5]
<b>Unit 3: Eigen values, Eigen vectors and Inner product spaces</b> Introduction to Eigen values and Eigen vectors of a matrix, Eigen Bases, Diagonalization, Inner product space, Norm of a vector, Normed vector space, Orthogonal and orthonormal sets, Gram Schmidt Orthogonalization process.	[7]
<b>Unit 4: Basic Probability &amp; Theoretical Probability Distributions</b> Basic concepts of probability, Random variables, Probability distributions, Probability mass	[7]



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function, Probability density function, Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial & Poisson's distributions, Properties of binomial, Poisson and normal distributions.

**Unit 5: Correlation & Linear Regression Analysis**

Introduction, Types of correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation Coefficient, Probable errors. Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Coefficients of regression, Properties of regression coefficient.

**Unit 6: Applied Statistics**

Test of significance for Large sample size (z tests) for single mean, difference of means, single proportion, difference of proportions, Test of significance for small sample size (t test)

**Text Books:**

1. G. V. Kumbhojkar, Probability and Random Processes, C. Jannadas and Co., 14th Edition, 2010.
2. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.
3. Stephen H. Friedberg, Linear algebra, 5<sup>th</sup> Edition, by Pearson.
4. David C Jay, Steven R Jay, Linear algebra and its applications, 5<sup>th</sup> edition, pearson

**Reference Books:**

1. Kishor S. Trivedi, Probability, Statistics with Reliability, Queuing and Computer Science Applications, Wiley India Pvt. Ltd, 2nd Edition, 2001.
2. Vijay K. Rohatgi, A. K. Md. Ehsaness Saleh, An Introduction To Probability and Statistics, Wiley Publication, 2nd Edition, 2001.
3. Seymour Lipschutz, Mark Lipson, Linear Algebra, 3<sup>rd</sup> edition, Schaum's Outline
4. Infostudy's Linear algebra by Dr. A.P. Singh , 3<sup>rd</sup> edition
5. Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines, 4th Edition, 2013



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**Data Structure**

23ADD2302	PCC	Data Structure	3-0-0	3 Credits
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<b>Teaching Scheme</b>	<b>Examination Scheme</b>
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Basics of C programming.

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

CO1	Understand the basics of data structure and its application.
CO2	Understand concepts of array and records.
CO3	Demonstrate the concepts of Linked List and apply various operations on them.
CO4	Understand concepts of stack and queue.
CO5	Demonstrate the concepts of Trees apply various operations on them.
CO6	Demonstrate Basic terminologies and representation of Graph.

**Course Contents:**

<b>Unit 1: Introduction &amp; Overview</b> Introduction to data structures & its data types, Operations, Algorithms: complexity, time space trade-off with example.	[6]
<b>Unit 2: Sorting and Searching Techniques</b> Introduction, linear arrays, representation of linear array in memory, traversing linear arrays, inserting & deleting, Selection sort, Insertion sort, Bubble sort, Merge sort, Radix sort (only algorithm), Quick Sort(only algorithm), Searching – Linear search, Binary Search.	[6]
<b>Unit 3: Stack and Queue</b> Introduction to stacks, stack as an Abstract Data type, representation through Arrays & linked lists, Applications of stacks, stacks & recursion, Queue as an abstract data type representation, circular, double ended, priority, application of queues.	[6]
<b>Unit 4: Linked List</b> Introduction, linked lists & its representation, Traversing & searching a linked list, memory allocation, Garbage collection, insertion & deletion of nodes of linked list, header linked list, two-way lists.	[6]
<b>Unit 5: Tree</b>	[6]

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Binary Tree: introduction, types, definition, properties, representations, operations, binary tree traversal, Header nodes; Threads, BST, Advanced trees : AVL trees or height balanced trees, representation operation, Expression trees, Multway trees: trees, multway search trees, B trees, Heaps, construction of a Heap	[6]
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**Unit 6: Graph and Hashing**

Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path matrix, Warshall's Algorithm, shortest paths, linked representation, Operations, Traversing, Posets, Topological sorting.  
 Array Representation: Linked list Representation, Traversal of graphs: Depth-first search (DFS), Breadth-first search (BFS), Applications of Graph Hashing, Hash function, Collision resolution techniques.

**Text Books**

1. S.Lipschutz, DataStructures, McGraw-Hill Publication, Revised.
2. Thomas Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.
3. E. Horowitz, S. Sahani, Fundamentals of Data Structures, Galgotia Publication, 1st Edition, 1983

**Reference Books:**

1. Kyle Loudon, Mastering Algorithms with C: Useful Techniques from Sorting to Encryption, O'Reilly Media, 1st Edition, 1999
2. Mark Allen Weiss, Data structures and algorithms analysis in C++, Pearson Education, 4th Edition, 2013.
3. Y. Langsam, M. Augenstein, A. Tamir, Data Structure using C and C++, Prentice Hall India Learning Private Limited, 2nd Edition, 1998.
4. Trembley and Sorraison, Introduction to Data Structures, PHI Publication, 2nd Revised Edition, 1983.



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**Database Technologies**

23AD2303	PCC	Database Technologies	3-0-0	3 Credits
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<b>Teaching Scheme</b>	<b>Examination Scheme</b>
Lecture: 3 hrs/week Tutorial: --	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Fundamentals of computer architecture, storage, and data

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

CO1	Build conceptual data model using Entity Relationship Diagram	[6]
CO2	Construct normalized database schemas	
CO3	Make use of SQL commands to develop database	
CO4	Apply triggers on database and develop procedure and function using PL/SQL.	
CO5	Demonstrate database administration skills	
CO6	Demonstrate NOSQL Database for applications	

**Course Contents:**

<b>Unit 1: Introduction to Database Management System</b> Introduction, Advantages and applications of DBMS, Data Independence, Data Abstraction, Database System architecture, Database users and DBA roles, Structure of relational databases, Keys, Entity-Relationship model Basic concepts, Design process, E-R diagrams, constraints, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema.	[6]
<b>Unit 2: Relational Database Design</b> The purposes of Normalization, Data Redundancies and Anomalies, Functional Dependencies-types of functional dependency, closure of set of functional dependency, canonical cover, The Process of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	[5]
<b>Unit 3: SQL concepts</b> Basics of SQL, DDL, defining constraints – Primary key, foreign key, unique, not null, check,	[7]



DML, DCL, Functions - aggregate functions, Built-in functions –numeric, date, string functions, set operators, sub-queries, Use of group by, having, order-by, join and its types, view and its types, Transaction control commands – Commit, Rollback, Savepoint.

**Unit 4: Introduction to PL/SQL**  
Introduction of PL/SQL, The PL/SQL block structure, Data types, Variables, and Constants, Control structure: Conditional control, Iterative control, Sequential control, Exception handling: Predefined Exception, User defined Exception, Cursors: Implicit and Explicit cursors, Declaring, Opening, and Closing a cursor, Fetching a Record from the cursor. Procedures, Functions, Database Triggers.

**Unit 5: Transaction management and Concurrency control**  
Transaction concept, A simple transaction model, ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping model, Recovery systems- Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, checkpoint, Shadow paging.

**Unit 6: Introduction to NoSQL Database**  
Introduction, Structured versus unstructured data, Comparative study of SQL and NoSQL, Types and examples of NoSQL Database- Key-value store, document store, graph, Distribution Models.

**Text Books:**

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, Database System Concepts, 6th Edition, McGraw-Hill International Edition, 2011.
2. Prasad J. Sadalage, Martin Fowler, —NoSQL Distilled-A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Education, Inc-2013.

**Reference Books:**

1. Date CJ, Korth A, Swamyrahan S, An Introduction to Database System, 8th Edition, Pearson Education 2006.
2. Raghu Ramakrishna, Johannes Gehrke, Database Management Systems, 3rd Edition, McGraw Hill, 2003.
3. Adam Fowler, NoSQL For Dummies, John Wiley & Sons, Inc., 2015





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**Data Structure Laboratory**

23AD2304	PCC	Data Structure Laboratory	0-2-0	1 Credits
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Teaching Scheme	Examination Scheme
Practical: 2hrs/week	CA-I: 15 Marks CA-II: 15 Marks Practical & Oral Exam: 20 Marks

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

CO1	Develop logic for insertion, deletion & display
CO2	Make use of an array for searching & sorting.
CO3	Construct a linked list, stack, queue, tree, and graph.

**Practical List:**

Sr. No.	List of Experiments
1	Program to insert an element into an array. Program to delete an element from an array.
2	Program to sort the array using Insertion sorting.
3	Program to sort the array using bubble sorting.
4	Program to search a number in an array using linear search.
5	Program to search a number in an array using binary search.
6	Program to perform PUSH & POP operation on the stack.
7	Write a program to implement linear queue operation using array.
8	Program to insert and delete node into linked list.
9	Write a program to create binary tree and perform In order, Preorder and Post Order.
10	Write a program to create a graph of n vertices using an adjacency list.

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**Database Technologies Laboratory**

23AD2305	PCC	Database Technologies Laboratory	0-2-0	1 Credits
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Teaching Scheme	Examination Scheme
Practical: 2 hrs/week	CA-I: 15 Marks CA-II: 15 Marks Practical & Oral Exam :20 Marks

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

CO1	Build conceptual data model using Entity Relationship Diagram
CO2	Make use of DDL, DML commands to develop database
CO3	Build SQL queries using operators, functions and SQL clauses.
CO4	Develop PL/SQL programs on SQL database.
CO5	Make use of database administration skills
CO6	Create NOSQL Database for applications

**Practical List:**

1.	Construct ER model for Bank/ Employee data management/College management.
2.	Use DDL commands to design schema using integrity constraints.
3.	Use DML commands and Apply SQL operations to queries.
4.	Write SQL queries for implementing SQL functions, group by, order by, and having clauses.
5.	Build SQL queries for the implementation of Joins and views.
6.	Make use of control structures and exception handling to develop PL/SQL programs.
7.	Develop PL/SQL Programs using Cursor and Trigger.
8.	Write PL/SQL code for functions/procedures.
9.	Set transaction controls for schemas.
10.	Create collections and documents in MongoDB using the command line



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Software Engineering and Management

23AD2306	EEM	Software Engineering and Management	2-0-0	2 Credits
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Teaching Scheme: Examination Scheme:

Lecture: 2 hrs./week

CA-I: 25 Marks  
CA-II: 25 Marks

Pre-Requisites:

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

CO1	Evaluate the significance of software engineering in IT industry.
CO2	Demonstrate expertise in software requirements gathering, analysis, and validation.
CO3	Evaluate effectiveness of applied architectural patterns and design principles.
CO4	Compare and contrast software development methodologies for project suitability.
CO5	Implement project management techniques to ensure effective planning and risk mitigation.
CO6	Explain the application of agile principles in project management.

Course Contents:

<b>Unit 1: Introduction to Software Engineering and Management</b>	[4]
Overview of Software Engineering, Importance of Software Engineering in the IT Industry, Software Development Life Cycle (SDLC), Roles and Responsibilities in Software Development Teams	
<b>Unit 2: Requirements Engineering</b>	[4]
Understanding Requirements Engineering Process, Requirements Elicitation Techniques, Requirements Analysis and Specification, Requirements Validation and Management	
<b>Unit 3: Software Design and Architecture</b>	[4]
Principles of Software Design, Architectural Patterns and Styles, Design Patterns,	



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Software Architecture Documentation

<b>Unit 4: Software Development Methodologies</b>	[4]
Waterfall Model, Iterative and Incremental Development-Model, Introduction to Agile Methodologies	
<b>Unit 5: Project Management in Software Development</b>	[4]
Project Planning and Estimation, Risk Management in Software Projects, Project Scheduling and Tracking, Communication and Collaboration in Project Teams	
<b>Unit 6: Agile Software Development</b>	[4]
Principles of Agile Manifesto, Scrum Framework, Kanban Method, Agile Practices: Sprint Planning, Daily Stand-ups, Retrospectives	
<b>Text Books:</b>	
1. Software Engineering: A Practitioner's Approach by Roger S. Pressman 2. Requirements Engineering: From System Goals to UML Models to Software Specifications by Axel van Lamswaerde 3. Software Architecture in Practice by Len Bass, Paul Clements, and Rick Kazman <b>Reference Books:</b> 1. Clean Code: A Handbook of Agile Software Craftsmanship by Robert C. Martin 2. Scrum: The Art of Doing Twice the Work in Half the Time by Jeff Sutherland 3. Kanban: Successful Evolutionary Change for Your Technology Business by David J. Anderson Agile Retrospectives: Making Good Teams Great by Esther Derby and Diana Larzen	



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**Environmental Sciences**

23AD2307	VEC	Environmental Sciences	2-0-0	2 Credit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Lecture: 2 hrs/week	Continuous Assessment 1: 25 Marks Continuous Assessment 2: 25 Marks

**Pre-Requisites:** NA

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

<b>CO1</b>	Explain nature of environmental studies
<b>CO2</b>	Explain various natural resources and associated Problems
<b>CO3</b>	Summarize various ecosystems
<b>CO4</b>	Explain the importance of conservation of biodiversity and its importance in balancing the earth.
<b>CO5</b>	Recognize various causes of environmental pollution along with various protection acts in India to limit the pollution
<b>CO6</b>	Interpret the information based on field study and prepare a report.

**Course Contents:**

<b>Unit 1: Nature of Environmental studies:</b> Definition, scope and importance, Multidisciplinary nature of environmental studies, Need for public awareness.	[2]
<b>Unit 2: Natural Resources and Associated Problems</b> <b>Forest resources:</b> Use and over-exploitation, deforestation, dams and their effects on forests and tribal people <b>Water resources:</b> Use and over-utilization of surface and ground water, floods, conflicts over water <b>Mineral resources:</b> Usage and exploitation, Environmental effects of extracting and using mineral resources <b>Energy resources:</b> Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources, Solar energy, Biomass energy, Nuclear energy. <b>Land resources:</b> land degradation, man-induced landslides, soil erosion and desertification. Role of individuals in the conservation of natural resources.	[3]
<b>Unit 3: Ecosystems</b> Concept of an ecosystem, Types of ecosystems, structure and function of an ecosystem.	[4]



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producers, consumer and decomposer. Energy flow in the ecosystem, food chain, food web and ecological pyramids, ecological succession. Different types of ecosystem

a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystem

**Unit 4: Biodiversity**

Introduction-Definition: genetic, species and ecosystem diversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Western Ghats as a biodiversity region Hot spot of biodiversity, Threats to biodiversity, man and wildlife conflicts, Conservation of biodiversity, In-situ conservation and Ex-situ conservation.

**Unit 5: Environmental Pollution and Environmental Protection**

Definition: Causes, effects and control measures of various types of pollution. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Concept of sustainable development: From Unsustainable to Sustainable development, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Forest Conservation Act, Wildlife Protection Act, Human Rights.

**Unit 6: Field work**

Visit to a local area to document Environmental assets-River, Forest, Grassland

Visit to local polluted site

Study of common plants, insects, birds

Study of ecosystem river, ponds etc

**Text Books :**

1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I &amp; II), Pune Vidyarthi Grah-Prakashan, Pune.
2. N. P. Ball, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.

**Reference Books:**

1. C. R. Wylie &amp; L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
4. Erwin Kreyzig, Advanced Engineering Mathematics, John Wiley &amp; Sons.
5. Peter O'Neil, A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore.

Visit to a local area to document Environmental assets-River, Forest, Grassland	[4]
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Mini Project-II			
23AD2308	CEP	Mini Project	0-0-2
			1 credit

Teaching Scheme	Examination Scheme
Practical: 2 hrs/week	Continuous Assessment-I: - 25 Marks Continuous Assessment-II: -25 Marks

**Pre-Requisites:** None.

**About Mini project**

The project is a part of addressing societal and industrial needs. A Mini project is a brief, intense event where students can work on some of the most important problems that the world is facing today. Mini projects are brainstorming events where people with diverse knowledge backgrounds, skill sets, and interests get together to predetermined problems, and come up with substantive, innovative, and comprehensive solutions. A Mini project's output might be ideas, a roadmap, or an actionable plan. Teams leverage design thinking and cutting-edge techniques to brainstorm and collaborate on potential solutions within a given time frame.

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

CO1	Identify problems based on societal /research needs
CO2	Apply Knowledge and interpersonal skills to solve societal problems in a group.
CO3	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO4	Analyze the impact of solutions in societal and environmental context for sustainable development.
CO5	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO6	Demonstrate project management principles during project work.



**Course Contents:**

<b>Week 1: Higher Education and Case Study Pedagogy</b>	<ul style="list-style-type: none"> <li>Students shall form a group of 3 to 4 students, while forming a group shall not be allowed less than three or more than four students, as it is a group activity.</li> <li>Allocation of mentor</li> </ul>	[2]
<b>Week 2: Topic Selection</b>	<ul style="list-style-type: none"> <li>Briefly interact with students to provide hand-holding for topic selection.</li> <li>Students should do survey and identify needs, which shall be converted into problem statement for mini project in consultation with faculty supervisor</li> <li><b>Illustrative Examples: Any Industry or Societal Problem</b></li> <li>Finalization of Title.</li> </ul>	[2]
<b>Week 3: Case Study Design/Mini project: Part 1</b>	<ul style="list-style-type: none"> <li>If needed, provide hand-holding to students for finalizing objectives.</li> <li>Review the objectives of the case study groups.</li> <li>Identify what can be quantified related to your topic and how.</li> <li>Decide objectives for your case study.</li> <li>Continue reading especially recent work specific to your topic.</li> </ul>	[2]
<b>Week 4: Case Study Design/Mini project: Part 2</b>	<ul style="list-style-type: none"> <li>Prepare a roadmap of your case study, identify what is to be measured on the field.</li> <li>Ensure student groups have finalized the objectives.</li> </ul>	[2]
<b>Week 5: Survey Design</b>	<ul style="list-style-type: none"> <li>Prepare a questionnaire and try it out with your group members as mock</li> <li>Decide sampling strategy.</li> </ul>	[2]
<b>Week 6: Analysis Phase-1</b>	<ul style="list-style-type: none"> <li>Students in a group shall understand problem effectively, propose multiple solution.</li> <li>The students have to work on different approaches and search for the different methodology to solve the problem in consultation with the project guide.</li> </ul>	[2]
<b>Week 7 Analysis Phase-2</b>	<ul style="list-style-type: none"> <li>The students have to finalize the best methodology to solve the problem in consultation with the project guide.</li> <li>25% Presentation has to be conducted by mentor/guide based on above activity.</li> </ul>	[2]
<b>Week 8: Analysis-3</b>	<ul style="list-style-type: none"> <li>Identify appropriate data visualization tools for your case study.</li> <li>Analyze the data</li> </ul>	[2]
<b>Week 9: Analysis-4</b>	<ul style="list-style-type: none"> <li>Identify appropriate data visualization tools for your case study.</li> <li>Analyze the data</li> </ul>	[2]

*[Handwritten Signature]*





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<b>Week 10: Report writing Part:1</b>	<ul style="list-style-type: none"> <li>Prepare an outline of the report and start organizing the write-up for the first draft.</li> <li>Prepare and submit the first draft of the report to the course coordinator.</li> </ul>	[2]
<b>Week 11: Report writing Part:2</b>	<ul style="list-style-type: none"> <li>Make necessary corrections if any as per the suggestions of course coordinator.</li> <li>Submit the final draft of the case study</li> </ul>	[2]
<b>Week 12: Final Presentation</b>	<ul style="list-style-type: none"> <li>50% Presentation has to be conducted by mentor/guide based on above activity.</li> </ul>	[2]



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**Fundamentals of Finance and Management**

23AIDMDA1	MDM	Fundamentals of Finance and Management	2-0-0	2 Credits
<b>Teaching Scheme:</b>		<b>Examination Scheme:</b>		
Lecture: 2 hrs./week		CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks		

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

CO1	Explain the Importance of Financial Management
CO2	Explain the different types of Annuity and Perpetuity
CO3	Identify different sources of finance
CO4	Analyze Capital Expenditure Decisions
CO5	Explain Dividend Decisions
CO6	Explain Liquidity Management

**Course Contents:**

<b>Unit 1: Introduction &amp; Basic Concepts</b>	[4]
Important functions of Financial Management, Objectives of the firm: Profit maximization vs. Value maximization, Role of Chief Financial Officer, Time Value of Money: concept and reasons, Compounding and Discounting techniques	
<b>Unit 2: Annuity and Perpetuity</b>	[5]
Types of Annuity: Deferred annuity, Fixed annuity, Immediate annuity, Variable annuity, Indexed annuity, Life annuity, Group annuity contracts, Fixed annuity, Perpetuity, Annuity payable for guaranteed time, Types of Perpetuity	
<b>Unit 3: Sources of Finance and Cost of Capital</b>	[4]
Different sources of finance: long term and short term sources, Cost of capital: concept, relevance of cost of capital, Implicit and Explicit cost, specific costs (its computation) and	

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weighted average cost (its computation)	
<b>Unit 4: Capital Expenditure Decisions</b>	[5]
Objectives of Capital Budgeting Process, Concept of Cash Flow, Methods of long term investment decisions - Discounted Payback Period, Net Present Value, Profitability Index, Average Rate of Return / Accounting Rate of Return, Internal Rate of Return (including relative merits and demerits of each of the methods)	
<b>Unit 5: Dividend Decisions</b>	[4]
Meaning, Nature and Types of Dividend, concept of pay-out ratio, retention ratio, Decisions and growth, Dividend policies and formulating a dividend policy, Dividend Theories: Walter's Model, Gordon's Model	
<b>Unit 6: Liquidity Management</b>	[4]
Various concepts of Working Capital, Management of Working Capital and Issues in Working Capital, Estimating Working Capital Needs; Operating or Working Capital Cycle, Policies relating to Current Assets – Conservative, Aggressive and Balance; Various sources of Finance to meet working capital requirements	
<b>Text Books:</b>	
1. Rostogi, Fundamentals of Financial Management, Taxmann Publications	
2. Fundamental of Financial Management, Sharma, Gupta, Kalyani Publishers, New Delhi.	
<b>Reference Books:</b>	
3. Fundamentals of Financial Management, Vandana Dangi, V.K. Global Pvt Ltd, New Delhi	
4. Parasuraman – Financial Management: A Step by Step Approach, Cengage Learning	

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<b>Introduction to Healthcare System</b>			
23ADMDBI	MDM	Introduction to Healthcare System	2-0-0
			2 Credits
<b>Teaching Scheme:</b>		<b>Examination Scheme:</b>	
Lecture: 2 hrs./week		CA-I: 10 Marks	
		CA-II: 10 Marks	
		Mid Semester Exam: 30 Marks	
		End Semester Exam: 50 Marks	

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

CO1	Explain the Importance of Healthcare system
CO2	Explain the different models of Healthcare system
CO3	Identify different functions of Healthcare technology and policy
CO4	Analyze Healthcare system technologies
CO5	Explain Health Care Management
CO6	Explain Recent Trends in Medical Healthcare

**Course Contents:**

<b>Unit 1: Introduction &amp; Basic of Healthcare</b> History of healthcare, Important functions of healthcare, Primary care, Secondary care.	[3]
<b>Unit 2: Health System Models</b> The Beveridge Model, The Bismarck Model, National health insurance model, Uninsured model.	[2]
<b>Unit 3: Health technology</b> Privacy of health data, Policy, Assessment, Types of Medical technology, Assistive technologies.	[4]
<b>Unit 4: Biomedical Equipment</b> Bio Potential Recording, Analytical & Diagnostic Instruments, Blood Flow Meters and Radiation Detectors, Physiotherapy and Surgical Instruments.	[6]
<b>Unit 5: Health Care Management</b> Introduction to principles of management in healthcare environment, Healthcare Service Providers, Computer and Information Management in Hospitals, Hospital Standards and	[3]



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Maintenance.	
<b>Unit 6: Recent Trends in Medical Healthcare</b> Embedded system design for bio medical applications, Health care System design using general purpose processor, IoT in Biomedical Applications, Medical Image Processing, mobile health care technologies	[6]
<b>Text Books:</b>	
1. Ronald S. Krug, Introduction to Health Care Systems, Springer Publications 2. Lee Haroun, Dakota Mitchell, Introduction To Health Care, Delmar Cengage Learning	
<b>Reference Books:</b>	
1. Anam Faruqi, Healthcare Management, Orange Books Publication 2. Joseph J Carr, John M Brown, Introduction to Biomedical Equipment Technology, Pearson India	



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**Entrepreneurship**

23ADMDCI	MDM	Entrepreneurship	2-0-0	2 Credits
<b>Teaching Scheme:</b>		<b>Examination Scheme:</b>		
Lecture: 2 hrs/week		CA-I: 10 Marks CA-II : 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks		

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

CO1	Identify qualities of entrepreneurs
CO2	Write project proposal
CO3	Use various entrepreneurship models
CO4	Explain various schemes supporting entrepreneurship
CO5	Think creative and innovative
CO6	Demonstrate entrepreneurial process by way of studying different case studies and find exceptions to the process

**Course Contents:**

<b>Unit 1: Introduction to entrepreneurship, concept of Market Survey</b> Definition, Steps towards successful enterprise, opportunity identification, various analytics to be performed for idea validation. Meaning, Types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly)	[3]
<b>Unit 2: Project report preparation</b> Prepare a specimen project report, Manage the project with network diagrams, Understand the dynamics of project review and control	[2]
<b>Unit 3: Introduction to various types of entrepreneurship</b> Social Entrepreneurship, Indigenous Entrepreneurship, Community-Based Enterprises and Community-Based Entrepreneurship.	[4]
<b>Unit 4: Business Plan and Idea Presentation</b> Transforming idea to plan on paper, various reports for validation of business, presenting and pitching idea.	[6]



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Unit 5: Business operations, Project Management and Organizational Structure Establishment of standard operating procedures, project management methodologies and tools, various organizational structure and role of each position in an enterprise.	[3]
Unit 6: Sales and Marketing Fundamentals and Methodologies Difference between sales and marketing, methods and models of sales and marketing for product and services, targeting international market	[6]
<b>Text Books:</b>	
1. Entrepreneurship - Successfully Launching New Ventures by Bruce R. Barringer, R. Duane Ireland	
2. Engineering Economics, R.Panesarayan, PHI publication	
<b>Reference Books:</b>	
1. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins, S.P. and Decenzo David A.	
2. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning	



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23HSSM01	VEC	Aptitude Skills-I (Numerical Ability)	Aptitude Skills- I	1-0-0	1 Credit
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Teaching Scheme:	Examination Scheme:
Lecture: 1hr	CA-I:25 Marks
Tutorial: NA	CA-II:25 Marks
Practical: NA	

**Pre-Requisites:** English Communication

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

1	Make use of multiplications, squares, square roots, cubes and cube roots to solve aptitude problems
2	Solve questions based on the Number system
3	Solve questions based on percentage, average, ratio, proportion, Speed, Time and Distance
4	Solve questions based on Profit & Loss and mensuration.

**Course Contents:**

<b>Unit 1</b>	<b>Speed Math Techniques</b> Multiplication, Squares, Square roots, Cubes, Cube roots	[3]
<b>Unit 2</b>	<b>Number System</b> Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions	[3]
<b>Unit 3</b>	<b>Basic Aptitude</b> Percentage, Average, Ratio and Proportion, Fraction, Partnership, Speed- Time- Distance, Speed, Time, and Distance, Trains, Boats, Streams, Races	[3]
<b>Unit 4</b>	<b>Business Aptitude</b> Profit & Loss, Simple Interest, Compound Interest, Geometry and Venn Diagram 2D and 3D Measurement, Venn diagram	[3]

**Text Books :**

1. Arun Sharma - Quantitative aptitude for CAT.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Publishers, 2016 edition

**Reference Books:**

1. Fast Track Objective Arithmetic Paperback, by Rajesh Verma – 2018
2. Teach Yourself Quantitative Aptitude, Arun Sharma
3. The Pearson Guide To Quantitative Aptitude For Competitive Examination by Dinesh Khaitan





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**Language Skill-1**

23HSSM02	VEC	Language Skill-1	0-0-2	1 Credits
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Teaching Scheme: Practical: 2hrs/week	Examination Scheme: CA-1: 25 CA-2: 25
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**Pre-Requisites:** Basics of Programming

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

1	Develop a flowchart and Algorithm to solve the given problem statements
2	Develop programs using Data Types and Operators
3	Make use of Decision Making and Looping Statements to develop conditional programs
4	Make use of Arrays to develop programs in C language

Experiment No.	Name of Experiment
1	Explain basics of C such as Editing, Compiling, Error Checking, executing, testing and debugging of Programs and Design Algorithms and Flowcharts.
2	Explain basics of Variable, Data types and operators and develop programs on arithmetic Operators.
3	Develop programs on Conditional, logical and Bitwise Operators.
4	Develop programs on Sizeof () and typecasting operator.
5	Develop programs on increment and decrement operator.
6	Develop programs on simple if and if-else statement.
7	Develop programs on simple if-else ladder and Nested if-else.
8	Develop programs on Switch case statement.
9	Develop programs on For-loop & Nested For-loop.
10	Develop programs on while and do-while loop.
11	Develop programs on one dimensional array.
12	Develop programs on two-dimensional array.
13	Develop programs on string handling functions.

**Text Books:**

1. C Programming Absolute Beginner's Guide, Que Publishing: 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Pearson Publication

**Reference Books:**

1. Programming in C Practical Approach by Ajay Mittal, Pearson
2. Let Us C, By Yashwanth Kanekar



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