Master of Computer Applications (Two Year Programme)
First Semester

680111 Mathematical Foundations (BSC)

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	Understand the basic concept of set theory, lattices, graph theory, discrete numeric function and algebraic structure.	**Skill development**
2	Describe basic knowledge of course content and distinguish between them in terms of their applications.	**Skill development, Employability**
3	Implement the course content to related engineering applications and problems faced in real life.	**Skill development, Entrepreneurship**
4	Apply the concepts of mathematics to the suitable technique for relevant industries and contribution to the society	**Skill development, Entrepreneurship**
5	Analyze the set theory, lattices, graph theory, discrete numeric function and algebraic structure to examine the real world problem.	**Skill development, Employability**
6	Design analytical skills and interpret applications of engineering beneficial in real time troubleshooting.	**Skill development, Employability**

UNIT-I
Sets Relations and Functions: Sets, Subsets, Power-Sets, Complement, Union and intersection. Demorgan's law Cartesian, products, Relations: relational Matrices, properties of relations, equivalence relation Functions: Injection, Surjection, Bijection, Composition of Functions, Permutations. Cardinality, the characteristic functions and Mathematical induction..

UNIT-II
Lattices: Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element ,Lattices, sub lattices , lsotonicity, distributive inequality lattice homomorphism, lattice isomorphism, complete lattice, complemented lattice distribution lattice

UNIT-III
Groups and Fields: Groups: Group axioms-permutation groups; Subgroups, Co-sets, Normal Subgroups, semi groups; Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial roots, applications.

UNIT-IV

Graphs: Finite graphs; incidence and degree, isomorphism, subgraphs and union of graphs; Connectedness; Walks paths and circuits Eulerian graphs. Trees properties of trees; pendant vertices in a tree, Center of tree Spanning trees and Cutvertices; Binary tree Matrix representation of graph, Incidence, Adjacency matrices and their properties. Applications of graphs in Computer Science.

UNIT-V

Discrete Numeric function and Recurrence relation: Introduction to discrete numeric functions and generating functions introduction to recurrence relations and recursive algorithms. Linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

Books:

1. J.P.Trembley & R.P.Manohar. "Discrete Mathematical Structure with applications to Computer Science
2. Nersingh Deo: Graph Theory. :: C.L. Liu Discrete Mathematics.
3. C.L. Liu: Discrete Mathematics
4. D.K. Jain: Discrete Structures

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Discuss** the basics of data structures.	**Skill development**
2	**Design** various linear and non-linear data structures available	**Employability**
3	**Describe** several sorting algorithms including quick sort, merge sort and heap sort.	**Skill development**
4	**Organize** some graph algorithms such as shortest path and minimum spanning tree	**Skill development**
5	**Analyze** the complexity of various algorithms for different data structures	**Employability**
6	**Evaluate** different data structure techniques for real world problems.	**Employability**

UNIT-I
Prerequisites: Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.
Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations
UNIT-II
General List: list and it's contiguous implementation, it's drawback; singly linked list - operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.
Time Complexity: models of computation, algorithm analysis, order architecture,time space complexities, computing the average and worst case analysis.
UNIT-III
Trees: definitions-height, depth, order, degree, parent and children relationship etc;Binary Trees- various theorems, complete binary tree, almost complete binary tree;Tree traversals-preorder, inorder and post order traversals, their recursive and nonrecursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree.Heap-definition.Miscellaneous features Basic idea of AVL tree- definition, insertion; deletion operations; basic idea of B-tree- definition, order, degree, insertion ;deletion operations;B-tree- definitions, comparison with B-tree; basic idea of string processing.
UNIT-IV
Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaning; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.
UNIT-V

Graphs: Overview, related definitions: graph representations- adjacency matrix,adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskal; dijkstra algorithm.

Books:

1. Theory and Problems of Data Structures, Seymour Lipschutz,Schaum'SOutline Series, McGraw Hill.
2. Kruse R.L. Data Structures and Program Design in C; PHI
3. TennenBaum A.M. & others: Data Structures using C & C++; PHI
4. Horowitz & Sawhaney: Fundamentals of Data Structures, GalgotiaPublishers.
5. Ullman "Analysis and Design of Algorithm" TMH
6. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
7. Sara Basse, A. V. Gelder, " Computer Algorithms," Addison Wesley
8. T. H. Cormen, Leiserson ,Rivest and Stein, "Introduction of Computeralgorithm," PHI

680113 Database Management Systems (DC-2)

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Differentiate** database systems from file systems by enumerating the features provided by database systems and execute various SQL queries	**Skill development**
2	**Define** the terminology, features, classifications, and characteristics embodied in database systems.	**Skill development**
3	**Design** principles for logical design of databases, including the E-R method and improve the database design by normalization.	**Employability**
4	**Evaluate** the principles of storage structure and recovery management.	**Skill development**
5	**Identify** the issues of transaction processing and concurrency control.	**Skill development**
6	**Analyze** an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary, file and page organizations, indexing methods including B tree, and hashing.	**Entrepreneurship**

UNIT-I
Introduction: Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.
ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.
UNIT-II
Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.
Relational Algebra & SQL: The structure, relational algebra with extended with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.
UNIT-III
Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT-IV
Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints.

UNIT-V
Distributed Database: basic idea, distributed data storage, data replication, data fragmentation- horizontal vertical and mixed fragmentation

Storage structure and file organizations: overview of physical storage media, magnetic disks-performance and optimizations, basic idea of RAID, file organizations, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization.

Books:
1.   Database System Concepts – A Silberschatz, H.F Korth, Sudersan, MGH Publication.
2.   An introduction to Database Systems – C.J Date 6th ed.
3.   Fundamentals of Database systems – L elmasri & Navathe III ed.
4.   An introduction to Database systems – B.C. Desai.

680114 Operating Systems (DC-3)

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Evaluate** different structures for operating systems	**Skill development**
2	**Analyze** theory and implementation of: processes, resource control (concurrency etc.)	**Entrepreneurship**
3	**Distinguish** system calls for managing processes, memory and the file system.	**Skill development**
4	**Demonstrate** the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system	**Employability**
5	**Apply** the various resource management techniques for distributed systems	**Employability**
6	**Discover** the different features of real time and mobile operating systems	**Entrepreneurship**

UNIT-I
Introduction: Evolution of operating systems, Types of operating systems, Different views of operating system, operating system concepts and structure.
Processes: The process concept, systems programmer's view of processes, operating system services for processes management, scheduling algorithms, Performance evaluation.
UNIT-II
Memory Management: Memory management without swapping or paging , swapping , virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging system, segmentation.
UNIT-III
Interprocess communication and synchronization: The need for interprocess synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors messages.
UNIT-IV
Deadlocks: Deadlock prevention, deadlock avoidance.
File system: File systems, directories, file system implementation security and protection mechanism.
Input/Output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access, Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software, User space I/O software.
UNIT-V
Disks: Disk hardware, scheduling algorithms, Error handling, track-at-a time caching RAM disk.
Clocks: clock hardware, memory mapped terminals, I/O software

Distributed file system: Design, implementation and trends.

Performance measurement: monitoring and evaluation introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

Case studies: MS-DOS, MS Windows and Linux(Unix) Operating System.

Books:

1.   Deitel   "An introduction to operating systems". Addison Wesley Publishing Company 1984.

2.   Milenkovic   M. "Operating Systems – concepts and design" McGraw Hill International Edition – Computer science series 1992.

3.   Peterson, Silberschatz. "Operating System Concepts". Addison Wesely Publishing Company, 1989.

4.   Tanenbaum A.S. "Modern Operating System" Prentice Hall of India Pvt Ltd 1995.

680115 Management Functions and Oral & Written Communication (BM-1)

Course outcome focused on employability/ entrepreneurship/ skill development

S. No.	Course Outcomes	Mapping
1	Speak effectively and appropriately in a public forum to a variety of audiences and purposes. (LOT1)	**Skill development**
2	Prepare presentations and arguments within the Engineering Profession effectively. (LOT2)	**Skill development**
3	Demonstrate comprehension of traditions in language as well as its social, cultural, and historical context. (LOT3)	**Entrepreneurship**
4	Relate management principles, processes and procedures in consideration of their effort on individual actions. (LOT3)	**Employability**
5	Infer day to day issues supplemented with interpretative skills achieved through management and communication. (HOT 5)	**Employability**
6	Implement professional work habits necessary for effective collaboration and cooperation with others. (HOT4)	**Employability**

Unit: 1
Communication: Meaning, Nature, Process, Elements of Communication, Importance of Effective Communication, Communication Situation, Barriers to Communication, Johari Window.
Verbal and Nonverbal Communication, Organisational Communication, Formal and informal communication, Grapevine Communication.
Unit: 2
Listening & Speaking, Speak, Read and Write, Improving Communication Skills. Speaking: Presentation: Conducting, Visual and Audio-visual aids. Group Discussion. Meetings. Interview. Telephonic Conversations, Seminar, Debates, and Public Speaking.
Unit: 3
Reading: Essentials of reading, Skimming and Scanning passages. Reading stories, articles, prose and fiction. [with reference to following three Short Stories:
1. R K Narayan — An Astrologer's Day
2. Ernest Hemingway — The Old Man at the Bridge
3. James Joyce – Araby
Unit: 4
Writing: Mechanics of Writing. Paragraph Writing. Letters: Essentials of Writing Letters, Types of Official Letters, Letters of complaints enquiry, order, and Informative. Applications: Job Applications, Drafting Biodata.
Writing Reports: Mechanics of Report Writing, Types of Report, Technical Report, Organising a report Précis Writing,

Unit 5:
a. Meaning Characteristics and Importance of management, Difference and Relationship between Organization, Management, and Administration. Contribution of Henry Fayol and F W Taylor. Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management.
b. Motivation, and theories of Motivation by Maslow, Herzberg, McClelland, Ash.
c. Decision making: Steps of decision making.

Reference Books:
1 Communication Skills for Engineers – Pearson Education.
2 Understanding Human Communication by Rodman and Adler published by OUP.
3 Technical Communication – Oxford University Press
4 Study Listening, Speaking Reading, Writing a series by Cambridge University Press.
5 The Practice of Management Peter Drucker Harper and Row
6 Essentials of Management: Koontz, Prentice Hall of India
7 Principles of Management by Stephen P Robbins et. al.

Object Oriented Programming Lab (DLC-1)

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	Adhere to object oriented programming constructs.	**Skill development**
2	Implement inheritance, polymorphism, encapsulation, abstraction.	**Employability**
3	Modify existing codes and classes as per the requirement of software development.	**Entrepreneurship**
4	Construct programming solutions to a broad range of query problems	**Employability**
5	Develops object oriented application system as part of a team in industry.	**Employability**
6	Design the classes and constructs for real time software as per societal needs.	**Entrepreneurship**

Data Types; Constant & Variable; Operators & expressions. Priority & associatively of operators.

Control Constructs- if-else, for while, do-while; Case statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Special constructs-Break, continue, exit (), goto & labels;

Functions; Arguments; Return Value; Parameter passing- call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples.

Overview of object oriented programming, evolution, features, comparison with procedural languages, applications, advantages. C++ basics, data types, Operators, loops and decisions, structures and functions, references.

Object model, OOD, OOA, abstraction, encapsulation, modularity, hierarchy , state, behavior and relationship among objects. Object oriented design, identifying classes and objects, object diagrams.

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Database Management Laboratory (DLC-2)

Course outcome focused on employability/ entrepreneurship/ skill development

S. No.	Course Outcomes	Mapping
1	**Design** database application system as part of a team.	**Employability**
2	**Solve** queries using SQL	**Skill development**
3	**Design** an information model expressed in the form of an entity relation diagram	**Employability**
4	**Adapt** normalization theory for a database.	**Employability**
5	**Implement** data definition language for the schema using a DBMS	**Skill development**
6	**Construct** database application system solutions to a broad range of query problems.	**Entrepreneurship**

Basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL. Creation of a database and writing SQL queries to retrieve information from the database. Performing insertion, deletion, modifying, altering, updating and viewing records based on conditions. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Creation of Views, Creating an Employee database to set various constraints. Creating relationships between the databases. Case Study using real life database applications.

Master of Computer Applications (Two Year Programme)
Third Semester

680311 Artificial Intelligence and Applications (DC)

Course outcome focused on employability/ entrepreneurship/ skill development

S. No.	Course Outcomes	Mapping
1	**Demonstrate** knowledge of the building blocks of AI as presented in terms of productions system	**Entrepreneurship**
2	**Analyse** and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them.	**Employability**
3	**Develop** intelligent algorithms for search, control strategies and game playing.	**Entrepreneurship**
4	**Attain** the capability to represent various real life problem domains using logic-based techniques and use this to perform inference or planning.	**Employability**
5	**Apply** concept planning and Natural Language processing to problems leading to understanding of cognitive computing.	**Skill development**
6	**Explore** the latest trends in soft computing, expert systems and machine learning.	**Entrepreneurship**

UNIT-I
An Overview of AI: Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI, AI Productions system and problem formulation.
UNIT-II
AI Search and Control Strategies: Exploring alternatives: Finding a path: Depth first search, hill climbing, breadth first search, beam search, best first search; Finding the best Path: The British Museum search, Branch and Bound Search, A* Search, AO* Search; Game Playing: Minmax search, Alpha-beta pruning, Progressive deepening, Heuristic Pruning.
UNIT-III
Knowledge Representations: Concept of data, information and knowledge, semantic nets, partitioned semantic nets,Prepositional calculus,First order predicate calculus, Well Formed Formula (WFF), Clause form representation of WFFs, resolution principle & unification, inference mechanism, frame systems and value inheritance, scripts, conceptual dependency.
UNIT-IV
Problem solving by Planning and uncertainty handling and NLP: Components of planning system, Gold Stack Planning, Nonlinear Planning using constraint posting, probability theory, statistical reasoning, fuzzy sets and fuzzy logic, Overview of linguistics, grammars and languages, Parsing techniques
UNIT-V
Expert systems and Soft Computing: Introduction and applications of expert systems, Rule-based System Architecture, Non-production system architecture, Expert system shells,

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Introduction to Some of the AI Techniques like neural networks, genetic algorithms, machine learning, pattern recognition, Robotics etc.

Books:
1.   Introduction to AI and Expert Systems: D.W. Patterson PHI.
2.   Artificial Intelligence: P.H. Winston, Addison Wesley.
3.   Principles of AI: N.J. Nilsson, Springer-Verlag
4.   Artificial Intelligence: Saroj Kaushik, Cengage Learning
5.   Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig, Pearson Education

680312: Management Support Systems (BM)

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Apply** basic concepts of Information Technology, its support and role in Management, for managers	**Employability**
2	**Recognize** security aspects of IT in business, highlighting electronic transactions, advanced security features	**Employability**
3	**Analyze** managerial decision-making and to develop perceptive of major functional area of MIS	**Entrepreneurship**
4	**Describe** emerging MIS technologies like ERP, SCM and trends in enterprise applications.	**Skill development**
5	**Translate** the role of information systems in organizations, the strategic management processes, with the implications for the management.	**Skill development**
6	**Apply** various information systems like DBMS together to accomplish the information objectives of an organization in Business Management	**Employability**

Unit-I
Organizations, Management and the Networked Enterprise – Information Systems in Global Business Today, Emerging digital firm, Strategy, perspectives and dimensions of Information systems, Network based strategies
Global E-business and Collaboration – Business processes, Systems for different management groups and Enterprise, E-Business, E-commerce, E-Government, Tools and technologies for Collaboration and Social Business, Porter's competitive forces model, The Business value chain Model
Unit-II
Ethical and Social issues in information systems – A model for Thinking about Ethical, Social, Political issues, Five moral dimensions of the Information Age, Ethical analysis, Candidate Ethical Principles
IT Infrastructure & Emerging Technologies – Evolution, Components, management issues, contemporary hardware platform trends, contemporary software platform trends, Web services and service-oriented architecture
Foundations of Business Intelligence – File organization terms and concepts, Capabilities of Database management Systems, Analytical tools, Databases design, managing data resources
Unit-III
Telecommunications, Internet and Wireless Technology – Networking and communication trends, signals, types of networks, internet services and communications tools, Wireless computer networks and internet access
Securing Information Systems – Malicious Software: Viruses, worms, Trojan horses, spyware, Hackers and computer crime, Internal threats, Business value of security and control:

Legal and Regulatory requirements for Electronic records management, Establishing a framework for security and control: Risk assessment, Security policy, technologies and tools for protecting information resources.

Unit-IV

Enterprise Information System - Achieving Operational Excellence and Customer Intimacy: Enterprise system, Applications, Business values of Enterprise systems, Supply chain management system: Supply chain, Global supply chain, customer relationship management: Operational and Analytical CRM, Business value of Customer relationship management systems, Enterprise applications: New opportunities and challenges

Managing Knowledge – Important dimensions of knowledge, types of knowledge management systems, requirements of knowledge work systems, expert systems.

Unit-V

Enhancing Decision Making – Business value of improved decision making, types of decisions, decision-making process, Business intelligence, decision support for operational and middle management, decision support for senior management, group decision support systems, modeling and designing systems: structured and object oriented methodologies, Alternative systems building approaches, Application development for the digital firm.

Project management – Runaway projects and system failure, project management objectives, importance of project management, linking systems projects to the Business plan, Information system costs and benefits, dimensions of project risk, change management and the concept of implementation, controlling risk factors, project management software tools.

Textbooks and References:

1. Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia.
2. Management Information Systems, Jawadekar, Tata McGraw Hill.
3. Management Information Systems, Davis and Olson, Tata McGraw Hill.
4. Analysis and Design of Information Systems, Rajaraman, Prentice Hall.
5. Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia.
6. Management Information Systems, Schulthesis, Tata McGraw Hill.
7. Management Information Systems - Sadagopan, Prentice Hall.
8. Management Information Systems – Jayant O

680313 DATA MINING AND WAREHOUSING (DC)

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Describe** the basics of data warehouse, its storage fundamentals and knowledge discovery in databases	**Skill development**
2	**Discuss** the storage and architectures of the data warehouse and its operations.	**Employability**
3	**Apply** the basics of data mining and it's techniques to various real life problems.	**Employability**
4	**Analyze** classification and clustering algorithms and concepts	**Employability**
5	**Select** appropriate DM tools for clustering, association, and classification problems	**Entrepreneurship**
6	**Explore** recent trends in data mining such as web mining, spatial-temporal mining	**Entrepreneurship**

UNIT-I
Data Warehouse Basic: Data warehousing Definition, usage and trends, DBMS vs. data warehouse, statistical databases vs. data warehouses. Data marts, Metadata, Multidimensional data model, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.
UNIT-II
Storage and Architecture of Data Warehouse: Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP types of OLAP, servers, 3 – Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager, data consolidation, warehouse internals, storage and indexing, Operations, materialized , online analytical processing(OLAP) systems
UNIT-III
Data Mining Basic: Data mining definition & task, KDD versus data mining, tools and applications. Data mining query languages, Preprocessing, pattern presentation & visualization specification, data mining techniques, tools and applications.
Data mining techniques: Statistical perspective, Regression, Bayes Theorem, Hypothetical testing.
UNIT-IV
Classification and Clustering: Issues in classification, Statistical –Based Algorithms, Distance–Based Algorithms, Decision Tree–Based Algorithms, ID3,C4.5, Evaluating the performance.
Clustering: Basic concepts, Partition algorithms, Agglomerative Hierarchical algorithms, DBSCAN, BIRCH, CURE algorithm. Clustering with categorical attributes, Comparison.
UNIT-V
Association Rules: Frequent Itemset generation, Apriori Algorithm. Rule generation, Compact representation of frequent Itemset.
Advanced Topics: Dimensionality Reduction, overview of Principle Component Analysis and SVD, Spatial mining, Web mining, Temporal mining.

Books:

1.   Jiawei Han & Micheline Kambe :Data Mining – Concepts & Techniques;
2.   Margaret H. Dunham, S. Sridhar:Data Mining Introductory and Advanced Topics
3.   Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining
4.   Kimball R, Reeves L , Ross M etc – Data Warehouse life cycle tool kit, John Wiley.
5.   Anahory: Data Warehousing in Real World, Addision Wesley
6.   Adriaans: Data Mining, Addision Wesley.
7.   JayeeBischaff& Ted Alexender : Data Warehouse: Practical advice from the Expert, Prentice Hall, New jursey.

680317 Web Technologies

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Evaluate** web application architecture, technologies, services and frameworks.	**Skill development**
2	**Integrate** javascript, Php and server side scripting languages to develop web applications.	**Employability**
3	**Debug**, test and deploy web applications in different web servers.	**Skill development**
4	**Apply** the knowledge of web technology in developing web applications.	**Employability**
5	**Implement** small to large scale projects to provide live solutions in web application development fields.	**Entrepreneurship**
6	**Evaluate** different solutions in the field of web application development.	**Entrepreneurship**

UNIT I
History of the internet: Internetworking concepts, architecture, and protocol: Switch router etc., internet address and domains. Introduction World Wide Web (WWW), Hyper Text Transfer Protocol (HTTP), feature of HTTP protocol HTTP request- response model, Hyper Text Transfer Protocol Secure (HTTPS). Security on the web, proxy server, Firewall.
UNIT II
Introduction to Hyper Text Markup Language (HTML): HTML elements, XHTML syntax and Semantics, extensible Markup Language (XML), element, attributes, entity declarations. DTD files and basics of Cascading Style Sheet (CSS), Document object Model (DOM) history and levels, Document tree.
UNIT III
Introduction to Java Script: Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays. Introduction to Web Services: UDDI, SOAP, WSDL.
UNIT IV
PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions.
UNIT V
PHP and MySQL : Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs

TEXT BOOKS:
1.   Web Technologies, Uttam Roy, OXFORD University press
2.   Web programming with HTML, XHTML and CSS, 2e, Jon Duckett, Wiley India
3.   Web programming Bai, Michael Ekedahl, CENAGE Learning, India edition.
4.   An Introduction to Web Design + Programming, Paul S.Wang, India Edition

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680319 Network and Cyber Security

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	**Discuss** various network security techniques, applications and policies.	**Skill development**
2	**Demonstrate** various computer security mechanisms and Symmetric Key Algorithms.	**Employability**
3	**Evaluate** security mechanisms using rigorous approaches by key ciphers	**Skill development**
4	**Analyse** the vulnerabilities in any computing system to secure an IT infrastructure	**Entrepreneurship**
5	**Employ** appropriate security techniques and policies to protect computers and digital information.	**Employability**
6	**Develop** policies and procedures to manage enterprise security risks.	**Entrepreneurship**

UNIT I
Computer Security : Introduction, Need for security, Basics of Cryptography : Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Polyalphabetic Substitution, Playfair, Hill Cipher, Transposition Cipher, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks
UNIT II
Symmetric Key Algorithms and AES: Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm. Overview of Symmetric key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC4, RC5, Advanced Encryption Standard (AES) Asymmetric Key Algorithms, Digital Signatures
UNIT III
Network Security, Firewalls and Virtual Private Networks: Brief Introduction to TCP/IP, Firewalls, Virtual Private Networks (VPN), Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), Secure Sockets Layer (SSL), E-mail Security.
UNIT IV
Introduction to information systems: Types of information Systems, Development of Information Systems, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.
UNIT V

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Security Policies: Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR.

TEXT BOOKS:

1. Bernard Menezes, "Network Security and Cryptography", CEGAGE Learning, ISBN-10:81-315-1349-1, ISBN-13: 978-81-315-1349-1, 2014.

2. Charles Pfleeger," Security in Computing", Prentice Hall, 4th Edition, ISBN-10: 0132390779, ISBN-13: 978-01323907744, 2006.

3. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR; 1st edition, ISBN-10: 0130142492, ISBN-13: 978-0130142498, 2000.

4. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, ISBN 10: 0133354695, 2013.

5. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.

6. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge   University   Press, 2006.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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680320 MACHINE LEARNING USING PYTHON

Course outcome focused on employability/ entrepreneurship/ skill development

S. No.	Course Outcomes	Mapping
1	Define basic concepts of Machine Learning.	**Skill development**
2	Summarize various concepts of python programming, data processing and visualization.	**Skill development**
3	Apply machine learning algorithms to solve real world problems using python programming.	**Employability**
4	Compare machine learning algorithms for applicability and performance analysis.	**Skill development**
5	Assess various open source datasets and estimate the most suitable machine learning model for prediction process.	**Employability**
6	Build machine learning models on open source datasets using python machine learning library.	**Entrepreneurship**

Unit – I
Introduction to Python Programming: Setting up programming environment, running python programs from a terminal, variables and simple data types: numeric, string, list, tuple, dictionary, set, boolean. Conditional statements and loops. Lambda functions; various inbuilt functions; Read write operations in files; Using python packages and modules.
Unit – II
Data processing and visualization: Introduction to Pandas, Installation, reading csv files and performing various operations: slicing, merging, concatenation on various datasets.
Introduction to NumPy, vector representation, basic operations on n-dimensional matrices using NumPy.
Data visualization using matplotlib, plotting various types of graphs: line, bar, scatter, histogram and pie-charts.
Unit – III
Introduction to Machine Learning: Basic principles, Applications, Challenges; Supervised, unsupervised and reinforcement learning approaches; Basic steps of Machine learning: data collection, data preparation, choosing a learning model, training a model, evaluation of model, parameter tuning and prediction.
Unit – IV
Supervised Learning: Linear regression, gradient descent, features, overfitting, regularization and complexity, training, validation, testing data, performance matrices: Mean Squared Error(MSE), Root-Mean-Squared-Error(RMSE), Mean-Absolute-Error(MAE), R^2 or Coefficient of Determination; multivariate regression; applications of regression.

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Classification: Binary, Multi-class and Multi-label classification; applications; Logistic regression, k- nearest neighbour, Decision trees, Random forests, Support vector machines and Neural networks; Comparison matrix.

Unit – V

Unsupervised Learning: clustering and association problems; applications; k-means, DBSCAN, Principal Component Analysis, Apriori algorithm for association rule learning problems.

Machine learning model building on various datasets available on Kaggle and UCI repositories using Python Machine Learning Library: Scikit-learn.

RECOMMENDED BOOKS:

1.	John Hunt, A Beginners Guide to Python 3 Programming, Springer, 1ˢᵗ Edition, 2019
2.	Learn Python the Hard Way: 3rd Edition
3.	Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes
4.	Andreas C. Müller, Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media, Inc, 2016.
5.	Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow, O'Reilly Media, Inc, 2017.

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680322 Minor Project

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	Organize, summarize and interpret technical literature with the purpose of formulating a project proposal.	**Entrepreneurship**
2	Write a technical report summarizing state-of-the-art on an identified topic.	**Skill development**
3	Define intended future work based on the technical review.	**Skill development**
4	Apply modern tools and technologies.	**Employability**
5	Apply SDLC and project Management principles.	**Employability**
6	Recognize the professional ethics and team management principles.	**Entrepreneurship**

Sample List of Projects

1. **Garbage Management System Project**
2. **On Road Vehicle Breakdown Assistance (ORVBA) Finder Project**
3. **Agri Shop For Farmers Online Shopping Android Application**
4. **Women Safety & Security System- Alert All Chat Application**
5. **COVID-19 (corona) Online Test Results & availability booking of Hospitals based Mobile App**
6. **Online Voting System Project Application**
7. **Vaccination Management System Software**
8. **Grievance App: College Campus for Hostel, Food, Admin and Certificate**
9. **Online Bus Pass Management System Application**
10. **Online Book Store : Ecommerce Application**
11. **Online Complaint Registration and Management system (street light, water pipe leakage, rain water drainage, road)**
12. **Traffic Squad : Penalty Collection & management based App**
13. **Crime Reporting Manage Online Complaint , FIR & CSR Android Application**
14. **Doctor Appointment Booking System**
15. **FUEL DELIVRY ON DEMAND based mobile app**
16. **College Management System Project**
Application To Access College Activities and Management – Events, Placement, Student Info, Results
17. **Digital E Gram Panchayat App**
18. **Student Attendance System App**
Student Attendance and Faculty Communication Application

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19.   **Child Safety Application**
20.   **GYM Management System Application**

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680323 PROGRAMMING LAB IN PYTHON

Course outcome focused on employability/ entrepreneurship/ skill development

S.No.	Course Outcomes	Mapping
1	Write, test, and debug simple Python programs.	**Skill development**
2	Implement Python programs with conditionals and loops.	**Skill development**
3	Develop Python programs step-wise by defining functions and calling them.	**Skill development**
4	Use Python lists, tuples, dictionaries for representing compound data.	**Employability**
5	Use Python libraries like Numpy and Pandas	**Employability**
6	Implement Python programs using basic libraries	**Entrepreneurship**

SAMPLE LIST OF PROGRAMS
1**.** Compute the GCD of two numbers. (CO1)
2. Find the square root of a number (Newton's method) (CO2)
3. Exponentiation (power of a number) (CO2)
4. Find the maximum of a list of numbers (CO4)
5. Linear search and Binary search (CO3)
6. Selection sort, Insertion sort (CO3)
7. Merge sort (CO3)
8. First n prime numbers (CO1)
9. Multiply matrices (CO2)
10. Programs that take command line arguments (word count) (CO4)
11. Find the most frequent words in a text read from a file (CO5)
12. Read/write data from a file (CO6)
14. Make a program to plot the data from files (CO5)

PLATFORM NEEDED
Python 3 interpreter for Windows/Linux