

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. VII Semester (Computer Science & Engineering) for batch admitted in Academic Session 2017-18

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allowed						Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOC's					
				End Sem.	Mid Sem. Exam	Quiz/Assignment	End Sem.	Lab Work & Assessment	Assignment		Exam	L	T	
1.	DE	DE	Departmental Elective (DE-2)	70	20	10	-	-	-	100	2	-	-	2
2.	DE	DE	Departmental Elective (DE-3)	-	-	-	-	-	20	70	2	-	-	2
3.	OC	OC	Open Category (OC-2)	70	20	10	-	-	-	100	2	1	-	3
4.	OC	OC	Open Category (OC-3)	70	20	10	-	-	-	100	3	-	-	3
5.	160008	MC	Interdisciplinary Projects (IPR) (MC)	70	20	10	-	-	-	100	2	-	-	2
6.	164701	DLC	Departmental Lab (DLC-1)	-	-	-	50	50	-	100	-	-	4	2
7.	164702	DLC	Summer Internship Project-III (60 weeks) (Evaluation) (DLC-2)	-	-	-	50	50	-	100	-	-	4	2
8.	164703	DLC	Creative Problem Solving (Evaluation) (DLC-3)	-	-	-	25	25	-	50	-	-	2	1
Total				280	80	40	125	125	20	75	14	1	16	17

Additional Courses for obtaining Honours or minor Specialization by elective students

Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

DE-2 (Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	150711	Matrix Computing with C++/P
2.	150712	Data Mining & Warehousing
3.	150713	Distributed Systems

DE-4*		
S. No.	Subject Code	Subject Name
1.	150751	Practical Machine Learning with TensorFlow
2.	150752	Scalable Data Science
3.	150753	Introduction to Internet of Things

OC-2		
S. No.	Subject Code	Subject Name
1.	160208	Soft Computing
2.	160209	Network Security
3.	160210	Data Mining & Warehousing

OC-3		
S. No.	Subject Code	Subject Name
1.	160251	IC Programming
2.	160271	Artificial Intelligence/Computer Networks
3.	160272	Computer Networks

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform




DEAN (ACADEMICS)
MITS
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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. VII Semester (Information Technology) (for batch admitted in Academic Session 2017-18)

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOODS					
				End Sem.	Mid Sem. Exams	Quiz/ Assignment	End Sem.	Lab Work & Semestral	Assignment	Exam	L	T	P	
1.	DE	DE	Departmental Elective (DE-2)	50	20	10	-	-	-	100	2	-	-	2
2.	DE	DE	Departmental Elective (DE-4)	-	-	-	-	-	25	75	100	2	-	2
3.	OE	OE	Open Category (OE-2)	70	20	10	-	-	-	100	2	1	-	1
4.	OE	OE	Open Category (OE-4)	70	20	10	-	-	-	100	2	-	-	1
5.	100000	MC	Information Systems Design (ISD) (MC)	70	20	10	-	-	-	100	2	-	-	2
6.	100700	ILC	Departmental Lab (ILC-4)	-	-	-	50	50	-	100	-	-	1	2
7.	100702	ILC	Summer Internship Project III (04 weeks) (Evaluation) (ILC-7)	-	-	-	50	50	-	100	-	-	1	2
8.	100701	ILC	Creative Problem Solving (Evaluation) (ILC-8)	-	-	-	25	25	-	50	-	-	2	1
Total				180	60	40	125	125	25	75	590	11	10	17

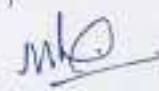
Additional Courses for obtaining Honours or minor Specialization by decision students

Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

OE-3 (Through Traditional Mode)			OE-4*			OE-5			OE-6		
S. No.	Subject Code	Subject Name	S. No.	Subject Code	Subject Name	S. No.	Subject Code	Subject Name	S. No.	Subject Code	Subject Name
1.	100711	Networking with TCP/IP	1.	100710	Practical Machine Learning with TensorFlow	1.	100210	Soft Computing	1.	100221	R Programming
2.	100712	Data Mining & Warehousing	2.	100712	Scalable Data Science	2.	100210	Network Security	2.	100221	Artificial Intelligence
3.	100713	Software Testing	3.	100713	Introduction to Internet of Things	3.	100210	Data Mining & Warehousing	3.	100222	Computer Networks

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform





DEAN (ACADEMICS)
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ANNEXURE – I

*Syllabi
of
Departmental Elective (DE) Courses
B.Tech VII Semester
(Computer Science & Engineering and
Information Technology)
Under Flexible Curriculum
[ITEM-2]*



Department of Computer Science & Engineering and Information Technology

NETWORKING WITH TCP/IP
150711/160711 (DE-3)

COURSE OBJECTIVES

- To build an understanding of the fundamental concepts of TCP/IP with computer networking
- To familiarize the student with the basic taxonomy and terminology of the TCP/IP area
- To understand the network traffic, congestion, controlling and resource allocation

Unit-I

Introduction : ARPANET, ISDN and Broadband ISDN, Protocols and Standards, Internet Administration, ATM Model, SONET & SDH, TCP/IP Protocol Suite, Network Addressing at various layer

Unit-II

IP Layer: Connection Oriented & Connection less Internet Working, IPV4 Addressing, Subnetting, Supernetting, Delivery and Forwarding of IP Packets, IPV4, IPV6, ARP, RARP, ICMPv4, IGMP, Mobile IP, Unicast Routing Protocols (RIP, OSPF, and BGP), Multicasting and Multicast Routing Protocols

Unit-III

TCP and UDP Layer: TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timer, UDP Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing, Stream Control Transmission Protocol

Unit- IV

Application Layer: Client-Server Paradigm, DHCP, DNS, TELNET, FTP, TFTP, World Wide Web and HTTP, Electronic Mail, SMTP, POP, IMAP, and MIME, SNMP, BOOTP

Unit-V

Multimedia and Next Generation Protocol: Voice over IP, Real Time Transport Protocol, IPv6 Addressing, IPv6 Protocol, ICMPv6, Firewall, PGP, HTTPS.

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RECOMMENDED BOOKS

- Data and Computer Communication, W. Stalling, Pearson
- Internetworking with TCP/IP - Vol - I, D.E. Comer, PHI
- Data Communication & Networking, B.A. Forouzan
- ISDN and Broad band ISDN with Frame Relay & ATM, W. Stalling
- LANs, Keiser

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 define the concept of computer network and various layered architecture
 - CO2 compare the classless and class full addressing of IPV4
 - CO3 identify the different types of networking devices and their functions within a network
 - CO4 analyze various protocols of computer networks for assisting network design and implementation.
 - CO5 design client server applications and communication model and protocols for communication.
 - CO6 elaborate various TCP/IP protocol for achieving multimedia and security services
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Department of Computer Science & Engineering and Information Technology

DATA MINING & WAREHOUSING
150712/160712 (DE-3)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems
- To gain understanding of algorithms commonly used in data mining tools
- To develop ability for applying data mining tools to real-world problems

Unit - I

Introduction: Motivation, important, Data type for Data Mining, Relational Databases, Data Ware-Houses, Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities, Concept/Class Description, Association Analysis, Classification & Prediction, Cluster Analysis, Outlier Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Data Mining Primitives, Languages and System Architectures, Concept Description, Characterization and Comparison, Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining, Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms &

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their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining

Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, **Predication: Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study**

RECOMMENDED BOOKS

- Data Mining Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications
 - Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd
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COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 classify various databases systems and data models of data warehouse

CO2 compare various methods for storing & retrieving data from different data sources/repository

CO3 apply pre-processing techniques for construction of data warehouse

CO4 analyse data mining for knowledge discovery & prediction

CO5 explain data mining methods for identification of association for transactional databases

CO6 develop various classification and clustering algorithms for data using data mining

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Department of Computer Science & Engineering and Information Technology

DISTRIBUTED SYSTEMS
150713 (DE-3)

COURSE OBJECTIVES

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit - I

Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed System, Hardware and Software Concepts, Distributed Computing Model, Advantages & Disadvantage Distributed System, Issues in Designing Distributed System.

Unit - II

Distributed Share Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & Its Types, Design & Implementations Issues in DSM System, Structure of Share Memory, Space, Consistency Model and Thrashing.

Unit - III

Distributed File System: Desirable Features of Good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Caching Scheme, File Application & Fault Tolerance

Unit - IV

Inter Process Communication and Synchronization: Data Representation & Marshaling, Group Communication, Client Server Communication, RPC-Implementing RPC Mechanism, Stub Generation, RPC Messages, Synchronization - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

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Unit - V

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms Case Study of Distributed System - Amoeba, Mach, Chorus.

RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson Pub
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1 tell the basic elements and concepts related to distributed system technologies
- CO2 demonstrate knowledge of the core architectural aspects of distributed systems
- CO3 identify how the resources in a distributed system are managed by algorithm
- CO4 examine the concept of distributed file system and distributed shared memory
- CO5 compare various distributed system algorithms for solving real world problems
- CO6 develop application for achieving various services of distributed system

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Department of Computer Science & Engineering and Information Technology

SOFTWARE TESTING
160713 (DE-3)

COURSE OBJECTIVES

- To understand defects and various levels of testing.
- To study about testing plan, management and its types.
- To understand the testing automation and its challenges.

Unit-I

Introduction: Overview, Objectives, Software Structure and Software Testing, Purpose of Testing, Testing vs. Debugging, Model for Testing, Taxonomy of Bugs, Mistakes, Bugs and Failures, Consequences of Bugs.

Unit -II

Testing Tactics: Software Testing Fundamentals, Basic Path Testing, Control Structure Testing, Black-Box Testing, Graph Based testing methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Testing, White Box Testing, Test Coverage – Traceability matrix.

Unit -III

Testing & Levels: Overview, Objectives, Testing Levels, Unit Testing, Component Testing, Integration Testing, System Testing, Interoperability Testing, Performance Testing, Regression Testing, Acceptance Testing.

Unit -IV

Special Tests: Introduction, Complexity Testing, Graphical User Interface Testing, Security Testing, Performance Testing, Volume and Stress Testing, Recovery Testing, Installation Testing, Requirement Testing.

Unit -V

Test Planning: Introduction, Test Policy, Test Strategy, Test Planning, Quality Plan and Test Plan, Guidelines for developing the Test Plan, Test Estimation, Test Standards, Building Test Data and Test Cases, Essential Activities in testing, Test

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Management Software, Test Log Document, Effective Test Cases, Test File, Building test Data, Rules and Responsibilities in Testing Life Cycle, Test Progress Monitoring

RECOMMENDED BOOKS

- Software Testing, Techniques and Applications, Arun Khannur, Pearson Education
 - Software Engineering, Roger S Pressman, Sixth Edition, Tata McGraw Hill
 - Software Testing Principles, Techniques and Tools, M G Limaye, Tata McGraw Hill
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COURSE OUTCOMES

After successful completion of the course students will be able to

- CO1 define different types of defects and testing models
 - CO2 demonstrate methods of test generation from requirements
 - CO3 explain different types of testing
 - CO4 apply software testing techniques in commercial environments
 - CO5 examine various test plans and continuous quality improvement
 - CO6 choose the various test tools for automation
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ANNEXURE – II

*Syllabi
of
Open Category (OC) Courses
offered by Department of CSE & IT
in B.Tech VII Semester
Under Flexible Curriculum*

[ITEM-4]



Department of Computer Science & Engineering and Information Technology

SOFT COMPUTING
900208 (OC-2)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals. Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANN's McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopfield networks

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lambda-Cuts for Fuzzy sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Fuzzy Inference System, Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for

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Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa, Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson
- Neural Networks and Learning Machines-Simon Haykin PHI
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1 define basic concepts of neural network and fuzzy systems
 - CO2 compare solutions by applying various soft computing approaches on a given problem
 - CO3 develop and train different supervised and unsupervised learning
 - CO4 classify various nature inspired algorithms according to their application aspect
 - CO5 compare the efficiency of various hybrid systems
 - CO6 design a soft computing model for solving real world problems
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Department of Computer Science & Engineering and Information Technology

NETWORK SECURITY
900209 (OC-2)

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms
- To understand how to apply encryption techniques to secure data in transit across data networks
- To explore the requirements of real-time communication security and issues related to the security of web services

Unit-I

Security: Principles and Attacks, **Basic Number Theory:** Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Stream Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm) **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest, MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates

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Unit-IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction) **IDS (Intrusion Detection System):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management **Firewalls:** Types, Functionality and Policies

Unit-V

Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf Attack, SYN Flooding, Distributed Denial of Service. **Hacker:** Hacking and Types of Hackers, Footprinting, Scanning, Types, Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education
- Incident Response and Computer Forensics, Kevin Mandia, Chris Proise, Tata McGraw Hill

COURSE OUTCOMES

After completion of the course students would be able to

- CO1: define various aspects of network security
 - CO2: illustrate fundamentals of number theory and cryptography
 - CO3: apply security mechanisms to achieve principles of network security
 - CO4: analyze the cause for various existing network attacks
 - CO5: examine the vulnerabilities in applications over internet
 - CO6: develop a secure protocol for achieving various network security services.
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Department of Computer Science & Engineering and Information Technology

DATA MINING & WAREHOUSING
900210 (OC-2)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems.

Unit - I

Introduction: Motivation, Important, Data Type for Data Mining, Relational Databases, Data Ware-Houses, Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems, & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation Data Cube Technology, Emerging Scenario of Pattern Warehousing System

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation, Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining, Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases, The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, Other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining

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Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1. classify various databases systems and data models of data warehouse
- CO2. compare various methods for storing & retrieving data from different data sources/repository.
- CO3. apply pre-processing techniques for construction of data warehouse.
- CO4. analyse data mining for knowledge discovery & prediction
- CO5. explain data mining methods for identification of association for transactional databases
- CO6. develop various classification and clustering algorithms for data using data mining.

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Department of Computer Science & Engineering and Information Technology

R PROGRAMMING
900220 (OC-3)

COURSE OBJECTIVES

- To understand the critical programming language concepts
- To perform data analysis using R commands
- To make use of R loop functions and debugging tools

Unit-I

Introduction to R, R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R, Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object-Oriented Programming in R, Introduction, S3 Classes, S4 Classes, References, Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linux and Mac.

RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education
- "R programming for Data Science", Roger D. Peng, Learn publishing

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COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 define basic programming constructs used in R
 - CO2 explain the various commands used in R
 - CO3 apply various concept of programming for controlling the flow of data using R
 - CO4 analyze the concept of concept of object oriented programming in R
 - CO5 choose appropriate packages of R programming for dealing various tasks
 - CO6 predict results from the datasets using R commands
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Department of Computer Science & Engineering and Information Technology
ARTIFICIAL INTELLIGENCE
900221 (OC-3)

COURSE OBJECTIVES

- To enhance the capability of analysis for Machine learning and fuzzy logic
- To apply the mathematical concepts in designing and executing the knowledge representation and problem solving.
- To design the mathematical model and rule formation for production system.

Unit-I

Introduction: Definition, Scope, Task and Objectives of Artificial Intelligence, AI Problems, Applications of AI, The Importance of AI, AI and related fields, Problems, Problem Spaces and Production System, Components of Production System, Characteristics of Production Systems, Types of Production System, Control Strategies, Application of Production Systems, water-jug, 8 – Puzzle and other advance Problems

Unit-II

Searching: The Blind and Informed Searches, Breadth First Search, Depth First Search and their implementation using Open and Closed list, Heuristic estimation and evaluation, Hill climbing and their Problems, Best First Search, Searching And-Or Graphs, A * search, AO * search.

Unit-III

Knowledge Representation: General Concept, Introduction, Definition and Importance of Knowledge, Approaches to Knowledge Representation, Issues in Knowledge Representation, Procedural and Declarative Knowledge, Forward Versus Backward Reasoning, Knowledge Representation Techniques, Logics, Propositional Logic, Predicate Logic

Unit-IV

Semantic Nets, Partition Semantic Nets, Frames, Conceptual Dependencies, Scripts, Bay's Theorem, Fuzzy Logic, Game Playing, Min – Max Search Procedure

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Unit-V

Planning, Understanding, Natural Language Processing, Speech Recognition, Computer Vision, Expert System and Expert System Cell

RECOMMENDED BOOKS

- Artificial Intelligence, Rich & Knight
- Introduction to Artificial Intelligence and Expert Systems, Dan W. Patterson, PHI publication

COURSE OUTCOMES

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

- CO1 outline the basic concepts of intelligent methods
 - CO2 summarize various algorithms used in artificial intelligence
 - CO3 identify the appropriate search methods to solve specific problems
 - CO4 analyze the performance of knowledge representation methods used in artificial intelligence
 - CO5 examine machine learning methods and robotics for listing their applications
 - CO6 design game playing techniques by applying programming methods of puzzle solving techniques
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Department of Computer Science & Engineering and Information Technology

COMPUTER NETWORKS
900222 (OC-3)

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices- Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Model.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing- FDM - Frequency Division Multiplexing, WDM - Wavelength Division Multiplexing & TDM - Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5

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Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing, Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd-Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm, Connection Oriented & Connectionless Service, IP Addressing

Unit-V

Presentation, Session & Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless, Session Layer – Dialog Control, Synchronization, Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India
- Computer Networks and Internets, Douglas E. Comer, Pearson India

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 explain the fundamental concepts of computer network
 - CO2 illustrate the basic taxonomy & terminologies of computer network
 - CO3 Identify various parameter for affecting the performance of computer network
 - CO4 analyze the concepts of communication using various layer of OSI model
 - CO5 evaluate the performance of computer network in congestion and Internet
 - CO6 design the network environment and applications for implementation of computer networking concept
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ANNEXURE - III

*Scheme and Syllabi
for
M.Tech (Computer Science & Engineering/ Information Technology/
Cyber Security) Programmes
[ITEM 11(a)]*



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Master of Technology (Computer Science & Engineering) (Semester - I) Recommended W.E.F JULY 2020
Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot		MOOC's			L	T	P	
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work/ sectional	Assignment	Exam					
1.	620111	Desktop Systems	70	20	10	-	-	-	-	100	3	-	-	3
2.	620112	Distributed Computing	70	20	10	-	-	-	-	100	3	-	-	3
3.	620113	High-speed Networks	70	20	10	-	-	-	-	100	3	-	-	3
4.	DE	Departmental Elective	70	20	10	-	-	-	-	100	3	-	-	3
5.	OC	Open Category Course (OC-1)	70	20	10	-	-	-	-	100	3	-	-	3
6.	620121	Lab-I	-	-	-	100	100	-	-	100	-	-	4	4
7.	620122	Self Learning Presentation	-	-	-	-	100	-	-	100	-	-	2	2
Total			350	100	50	30	100	-	-	750	15	-	6	21

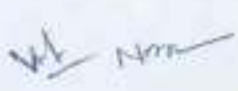
Open Category course (OC-1) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects.

During lab, students have to perform practical assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

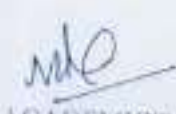
Self learning/ presentation through SWAYAM/ NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-1	
Subject Code	Subject Name
620114	Mobile Computing & M4 services
620115	Ad-hoc & Sensor Based Networks
620116	Network Security
620117	Computer Architecture and Parallel Processing

OC-1	
Subject Code	Subject Name
620118	Soft Computing
620119	Blockchain Technology
620120	Machine Learning using Python







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Master of Technology (Computer Science & Engineering) [Semester-II] **Recommended W.E.F JULY 2020**

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot		MOOCs			L	T	P	
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam					
1.	620211	Algorithm Design Techniques and Analysis	70	20	10	-	-	-	-	100	3	-	-	3
2.	620212	Advanced Topics in Data Mining & Warehousing	70	20	10	-	-	-	-	100	3	-	-	3
3.	620213	Image Processing and Retrieval Techniques	70	20	10	-	-	-	-	100	3	-	-	3
4.	DE	Departmental Elective-II	-	-	-	-	-	25	75	100	3	-	-	3
5.	OC	Open Category Course (OC-2)	70	20	10	-	-	-	-	100	3	-	-	3
6.	620221	Lab-II	-	-	-	80	80	-	-	160	-	-	4	4
7.	620222	Self Learning Presentation	-	-	-	-	100	-	-	100	-	-	2	2
		Total	280	80	40	80	180	25	72	720	15	-	6	21

Elective-II course will run through SWAYAM / NPTEL / MOOC based learning platform with credit transfer facility.

Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform with credit transfer facility] and accordingly, OC-2 pool may be created from the list of SWAYAM/NPTEL courses.

During Lab, students have to perform practical/assignment/online projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2 (Tentative)

Subject Code	Subject Name
620214	Internet of Things
620215	Deep Learning
620216	Cloud Computing
620217	Social Networking


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Master of Technology (Computer Science & Engineering) (Semester-III) **Recommended W.E.F JULY 2020**

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
			Theory Slot			Practical Slot		MIDOC's			L	T	P	
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assignment	Exam.					
1.	620311	Discretionary Paper Literature Review Problem Formulation Design/ survey paper etc.	-	-	-	150	100	-	-	250	-	-	10	10
2.	OC	MIDOC Course	-	-	-	-	-	25	75	100	-	-	02	02
Total			-	-	-	150	100	25	75	350	-	-	12	12

*MIDOC course will be treated as the course of open nature and will be decided by concerned department / Inst.

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Master of Technology (Computer Science & Engineering) [Semester-IV] **Recommended W.E.F JULY 2020**

Scheme of Examination

Scheme of Examination												
S. No.	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
			Theory Slot			Practical Slot			L	T	P	
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation					
1.	620405	Dissertation Part-II	-	-	-	100	200	300	-	-	14	14
		Total	-	-	-	100	200	300	-	-	14	14

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Master of Technology (Information Technology) (Semester - I) Recommended W.E.F JULY 2020
Scheme of Examination

Scheme of Examination														
S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Periods per week			Total Credits	
			Theory Slot			Practical Slot		MOOCs		L	T	P		
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work/ sessional	Assignment	Exam					
1.	630111	Database Systems	20	20	10	-	-	-	-	100	3	-	-	3
2.	630112	Distributed Computing	20	20	10	-	-	-	-	100	3	-	-	3
3.	630113	Highspeed Networks	20	20	10	-	-	-	-	100	3	-	-	3
4.	DE	Departmental Elective-I	20	20	10	-	-	-	-	100	3	-	-	3
5.	OC	Open Category Course (OC-1)	20	20	10	-	-	-	-	100	3	-	-	3
6.	630121	Lab-I	-	-	-	50	60	-	-	120	-	-	4	4
7.	630122	Self Learning Presentation	-	-	-	-	100	-	-	100	-	-	2	2
Total			150	100	50	50	160	-	-	780	15	-	4	28

Open Category course (OC-1) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. During lab, students have to perform practical assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.
Self learning / presentation through SWAYAM / NPTEL. (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-1	
Subject Code	Subject Name
630114	Mobile Computing & M-Communications
630115	Adverse & Sensor Based Networks
630116	Information Security & Systems
630117	Models and Techniques in Computer Graphics

OC-1	
Subject Code	Subject Name
630118	Self Computing (800105)
630119	Blockchain Technology (800106)
630120	Machine Learning using Python (800107)

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Master of Technology (Information Technology) (Semester-II) Recommended W.E.F JULY 2020
Scheme of Examination

S. No	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot		MOOCs			T	P	P	
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam					
1.	630211	Algorithm Design Techniques and Analysis	70	20	10	-	-	-	-	100	3	-	-	3
2.	630212	Advanced Topics in Data Mining & Warehousing	70	20	10	-	-	-	-	100	3	-	-	3
3.	630213	Image Processing and Retrieval Techniques	70	20	10	-	-	-	-	100	3	-	-	3
4.	DE	Departmental Elective-II	-	-	-	-	-	25	75	100	3	-	-	3
5.	OC	Open Category Course (OC-2)	70	20	10	-	-	-	-	100	3	-	-	3
6.	630221	Lab-II	-	-	-	50	50	-	-	170	-	-	4	4
7.	630222	Self Learning Presentation	-	-	-	-	100	-	-	100	-	-	2	2
		Total	280	80	40	90	160	25	75	750	15	-	6	21

Elective-II course will run through SWAYAM / NPTEL / MOOC based learning platform (with credit transfer facility).

Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. (This course may be run through SWAYAM/NPTEL based platform (with credit transfer facility) and accordingly, OC-2 pool may be created from the list of SWAYAM/NPTEL courses).

During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2 (Tentative)	
Subject Code	Subject Name
630214	Internet of Things
630215	Deep Learning
630216	Cloud Computing
630217	Social Networking

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Master of Technology (Information Technology) [Semester (III)] **Recommended W.E.F JULY 2020**
Scheme of Examination

Scheme of Examination														
S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
			Theory Slot			Practical Slot		MOOCs			T	P		
			End sem Exam	Mid sem	Quiz/ Assignment	End Sem. /Practical Viva	Semester Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assignment	Exam					
1.	670711	Disertation Part I if necessary Review Problem Formulation Design & system paper etc. I	-	-	-	150	100	-	-	250	-	-	10	10
2.	OC	MOOC* Course	-	-	-	-	-	25	25	100	-	-	02	02
Total			-	-	-	150	100	25	25	350	-	-	12	12

* MOOC course will be treated as the course of open nature and will be decided by concerned department / DoS.

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Recommended W.E.F JULY 2020

Master of Technology (Information Technology) (Semester-IV) Scheme of Examination

Scheme of Examination												
S. No.	Subject Code	Subject Name	Maximum Marks Allotted				Contact Hours per week				Total Credits	
			Theory Slot			Practical Slot	Total Marks	L	T	P		
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva						Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation
1.	630405	Dissertation Part-II	-	-	-	300	200	500	-	-	14	
		Total	-	-	-	300	200	500	-	-	14	

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Master of Technology (Cyber Security) (Semester - I) Recommended W.E.F JULY 2020

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Periods per week			Total Credits
			Theory Slot				Practical Slot		MOOCs					L	T	P	
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work/ sessional	Assignment	Exam								
1.	640111	Database Security and Privacy	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
2.	640112	Distributed Computing	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
3.	640113	High-speed Networks	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
4.	DE	Departmental Elective-I	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
5.	OC	Open Category Course (OC-I)	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
6.	640121	Lab-I	-	-	-	90	60	-	-	-	-	150	-	-	4	4	
7.	640122	Self-Learning / Presentation	-	-	-	-	100	-	-	-	-	100	-	-	2	2	
		Total	350	100	50	90	160	-	-	-	-	750	15	-	6	21	

Open Category course (OC-I) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects.

* During lab/s, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-1	
Subject Code	Subject Name
640114	Cyber Law and Emerging Jurisprudence
640115	Cloud Computing and Security
640116	E-Commerce Security
640117	Biometric Systems and Biometric Image Processing

OC-1	
Subject Code	Subject Name
640118	Soft Computing
640119	Blockchain Technology
640120	Machine Learning using Python

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Master of Technology (Cyber Security) (Semester-II) Recommended W.E.F JULY 2020

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Contact Periods per week			Total Marks	Total Credits		
			Theory Slot			Practical Slot				MOOCs		L			T	P
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam							
1.	640211	Cyber Crime Investigations and Digital Forensics	70	20	10	-	-	-	-	-	3	-	-	100	3	
2.	640212	Advanced Topics in Data Mining & Warehousing	70	20	10	-	-	-	-	-	3	-	-	100	3	
3.	640213	Information Security & Systems	70	20	10	-	-	-	-	-	3	-	-	100	3	
4.	DE	Departmental Elective-II	-	-	-	-	-	-	-	25	7	-	-	100	3	
5.	OC	Open Category Course (OC-2)	70	20	10	-	-	-	-	-	3	-	-	100	3	
6.	640221	Lab-II	-	-	-	-	90	60	-	-	-	-	4	150	4	
7.	640222	Self Learning / Presentation	-	-	-	-	-	100	-	-	-	-	2	100	2	
Total			280	80	40	90	160	160	25	75	15	-	6	750	21	

* Elective-II course will run through SWAYAM / NPTEL / MOOC based learning platform (with credit transfer facility).

** Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform (with credit transfer facility) and accordingly, OC-2 pool may be created from the list of SWAYAM/NPTEL courses]. During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

Self learning / presentation through SWAYAM / NPTEL. (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2 (Tentative)	
Subject Code	Subject Name
640214	Internet of Things
640215	Deep Learning
640216	Cloud Computing
640217	Social Networking

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Master of Technology (Cyber Security) (Semester-IV) Recommended W.E.F JULY 2020

Scheme of Examination

Scheme of Examination												
S. No.	Subject Code	Subject Name	Maximum Marks Allotted					Contact Hours per week			Total Credits	
			Theory Slot			Practical Slot		Total Marks	L	T		P
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation					
I.	6-0403	Dissertation Part-I	-	-	-	300	200	-	-	14	14	
		Total	-	-	-	300	200	-	-	14	14	

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*Syllabi
of
Departmental Core (DC) Courses
M.Tech I Semester
(Computer Science & Engineering/
Information Technology/ Cyber Security)*



Department of Computer Science & Engineering and Information Technology

DATABASE SYSTEMS
620111/630111

UNIT I

Review of Databases, Characteristics & Implications of Database Approach, Data Models, Architectures, Database Languages & Interfaces, Classification of DBMS, Data Independence, ER-Models, High Level Conceptual Data Models, Relationships, ER-Diagrams, Design Issues.

UNIT II

Object Oriented and Extended Relational Databases, Concepts of Object Oriented Databases, Object Identity, Object Structure and Type Constructors, Encapsulation of Operations, Methods & Persistence, Type Hierarchies and Inheritance, Object Database Standards, Object Definition Language, Object Query Language and Object Database Conceptual Design.

UNIT III

Distributed Databases, Concepts, Fragmentation, Replication, Allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, Query Processing, Concurrency Control and Recovery, Distributed Databases in Oracle.

UNIT IV

Transaction Processing: Introduction, Transaction and System Concepts, Properties of Transactions, Schedules & Recoverability, Serializability of Schedules, Transaction Support in SQL, Concurrency Control Techniques, Locking Techniques, Time Stamp Ordering, Multi Version Concurrency, Validation Concurrency, Locks for Concurrency Control.

UNIT V

Image and Multimedia Databases, Modeling and Storage of Image and Multimedia Data, Data Structures- R-Tree, k-d Tree, Quad Trees, Content Based Retrieval, Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, WEB Database, Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems, Mobile Databases, Case Study Oracle Xi.

Recommended Books:

1. Elmasri, Navathe, Somayajulu, Gupta, "Fundamental of Database Systems", 4th Edition, Pearson Education, 2007.
 2. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998.
 3. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007.
 4. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 6th Edition, 2006.
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COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 recall the fundamental of RDBMS, DBMS storage structures and access techniques
 - CO2 illustrate the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
 - CO3 make use of various concurrency control mechanisms for error free transaction processing
 - CO4 analyze various types of databases
 - CO5 design ER-models to represent simple database application scenarios and improve the database design by normalization
 - CO6 propose the improved data-intensive application using DBMS APIs program
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Department of Computer Science & Engineering and Information Technology

DATABASE SECURITY AND PRIVACY
640111

UNIT I

DBMS concepts: introduction, Data Models, Entities and Attributes, Relationships, E-R Diagram, Relational Data Models Domains, Tuples, Attributes, Keys, Relational Database, Schemas, Integrity Constraints, Relational Algebra and Relational Calculus, Functional Dependencies and Normalization for Relational Database Hash-Based Indexing, Static Hashing, Extendible hashing, Linear hashing, Comparisons, Query Processing and Optimization, Distributed databases, Client/Server Database Fragmentation, Replication, Location & Fragment transparency, Distributed Query processing and Optimization.

UNIT II

Database Protection, Integrity, Constraints in Query-by-Example, Security in Query-by-Example, Concurrent Operations on the Database, Basic Concepts, Simple Transaction Model, Model with Read- and Write-Locks, Read-only, Write-only Model, Concurrence for Hierarchically Structured Items, Protection against Crashes, Optimistic Concurrency Control.

UNIT III

Security Principle, E-mail Security, Database Recovery Criteria, Database Security, Develop Continuity and Recovery Plans, Physical and Environmental Security, Security Plan for Implementation, Goals of Database Security, Access Control, Statistical Database Security.

UNIT IV

Security Perimeter, Relationship between a Security Policy and Security Model, State Machine Models, Confidentiality and Integrity Models, Bell-LaPadula Model, Biba Model, Bell-LaPadula versus Biba, Clark-Wilson Model, Information Flow Model, Noninterference Model, Brewer and Nash Model, Graham-Denning and Harrison-Ruzzo-Ullman Models, Access Matrix Models.

UNIT V

Security Management, Data/ Information, Protecting Password File, Access Control Structure, Software Security, Element of Information Security, Steps for Better Security, Malicious Software, System Security Assurance Concepts, Importance of Information System.

Reference Books:

1. R. Elmasri, S. Navathe, Fundamentals of Database System, Pearson Education
2. C. J. Date, An Introduction to data base Systems, Volume 1, Pearson Education
3. Database Systems, SK Singh, pearson education

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- 4 H. F. Korth and A. Silberschatz Database Concepts, TMH
- 5 Godbole, "Information system security", Wiley
- 6 Cole Krutz & Conley "Network security" Wiley
- 7 CISSP Certification, "Security Models and Architecture", CISSP

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1 recall the basic concepts of database management system and indexing used in database management system
 - CO2 explain various terminology used in database protection
 - CO3 apply various database security principles like Email security, database recovery etc
 - CO4 analyze the different security parameters used for database security
 - CO5 evaluate different database security principles and parameters for database security measures
 - CO6 design a secure and robust database for an information system.
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Department of Computer Science & Engineering and Information Technology

DISTRIBUTED COMPUTING
620112/630112/640112

UNIT I

Introduction To Distributed System, Communication Layered Protocols, Client Server Protocols, RPC, Group Communication, Coordination, Synchronization & Consistency, Logical Clocks, Physical Clocks, Mutual Exclusion, Election Algorithms, Atomic Broadcast, Sequential Consistency, Transaction Distributed Consensus, Threads, Thread Synchronization, Implementation Issues and Threads Vs RPC

UNIT II

Models Of Distributed Computing, Client Server and RPC, RPC Architecture, Exceptions, Underlying Protocols, IDL, Marshalling Etc, Group Models and Peer to Peer Groups for Service Replication/ Reliability, Groups For Parallelism/ Performance, Client/ Server Vs. Peer-To-Peer, Multicast, Atomic Broadcast

UNIT III

Distributed File System, Security, Naming/ Location Transparency, R/W Semantics, Cache Coherence, Replication, Distributed Shared Memory, DSM Architecture, Consistency Models and Relation to Caching, Release Consistency, Comparison with Message Passing and RPC

UNIT IV

Fault Tolerant Distributed Systems, Introduction, Dependability, Faults Vs Errors Vs Failure, Space Time and Value Redundancy, Fault Tolerant Architecture, Failure Detection Algorithms, Partitioning, FT Consensus

UNIT V

Distributed Multimedia System, Introduction, Characteristics, And Resource Management, Stream Adaptation, Security, Introduction, Security Techniques, Cryptographic Algorithms, Authentication and Access Control, Case Study, CORBA, MACH

Recommended Books:

1. Andrew S Tanenbaum, Distributed Systems: Principles and Paradigms, Pearson
 2. Pradeep K. Sinha, Distributed Operating Systems, PHI
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COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 demonstrate knowledge of the basic elements and concepts related to distributed system technologies
- CO2 summarize various architectures used to design distributed systems
- CO3 build distributed systems using various inter-process communication techniques

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- CO4: analyze a problem and form a distributed system to work towards a solution.
CO5: explain various distributed algorithms, such as logical clocks and leader election.
CO6: propose own reflections and attitudes in regard to the area of research
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Department of Computer Science & Engineering and Information Technology

HIGH-SPEED NETWORKS
620113/630113/640113

UNIT I

Review of Networking and Networking Protocols, TCP/IP Model, OSI Model, Internet Protocols and Addressing, Routing and Internetworking, Network-Layer Routing, Congestion Control at Network Layer, Logical Addressing, IPv4 Addresses, IPv6, Multicasting Techniques and Protocols.

UNIT II

Transport and End-to-End Protocols, Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control, Application Layer, Principles of Network Applications, Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS).

UNIT III

Optical Networks and WDM Systems, Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, WDM Network elements, Optical line terminals and amplifiers.

UNIT-IV

ATM-based Services and Applications, ATM Switching, ATM Transmission, Wireless ATM and mobile ATM, Security in ATM network, VPNs, Introduction, Tunneling and Overlay Networks, Virtual Private Networks (VPNs), Overlay Networks - VoIP.

UNIT-V

Mobile Ad-Hoc Networks, Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks - Wireless Sensor Networks, Sensor Networks and Protocol Structures.

Recommended Books:

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall
3. Adhoc Wireless Networks: Architecture & protocols, Sivaram Murthy, PHI
4. Optical Networks: Third Generation Transport Systems, Ulyess Black, Pearson
5. Optical Networks: A Practical Perspective, Rajeev Ramaswami and N. Sivarajan, Morgan Kaufmann
6. ATM Networks: Concepts, Protocols, Applications, Rainer Handel, Huber and Schroder, Pearson

COURSE OUTCOMES

After completion of this course, the students would be able to:

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- CO1: recall the understanding of network engineering principles for network, system and service management.
 - CO2: classify the theoretical and practical concepts behind the design of multi-contained applications and the need for service integration.
 - CO3: apply the knowledge of Advanced Network Engineering including design, routing, management, security, performance and ability to understand and use industry standard tools used.
 - CO4: solve the problems associated with network design, routing, management, security and performance.
 - CO5: analyze the concepts underlying different protocols, QoS architectures and mechanisms and their main characteristics and functionality.
 - CO6: assess the network management issues and devise adequate network management solutions using industry design techniques/possible research opportunities.
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*Syllabi
of
Departmental Core (DC) Courses
M.Tech II Semester
(Computer Science & Engineering/
Information Technology/ Cyber Security)*



Department of Computer Science & Engineering and Information Technology

ALGORITHMS DESIGN TECHNIQUES AND ANALYSIS
620211/630211

UNIT I

Introduction: Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Recursive and Non-recursive Algorithms, Empirical Analysis of Algorithms, Brute Force and Exhaustive Search, Sequential Search and Brute-Force String Matching, Closest-Pair and Convex-Hull Problems.

UNIT II

Decrease-and-Conquer: Topological Sorting, Fake-Coin Problem, Russian Peasant Multiplication, Josephus Problem, Computing a Median and the Selection Problem, Game of Nim. **Transform-and-Conquer:** 2-3 Trees, Horner's Rule and Binary Exponentiation, Computing the Least Common Multiple, Counting Paths in a Graph.

UNIT III

Space and Time Trade-Offs: Sorting by Counting, Input Enhancement in String Matching, Boyer-Moore Algorithm, Open Hashing (Separate Chaining), Closed Hashing (Open Addressing), B-Trees

UNIT IV

Iterative Improvement: Simplex Method, Maximum-Flow Problem, Maximum Matching in Bipartite Graphs, Stable Marriage Problem. **Limitations of Algorithm Power:** Lower-Bound Arguments, Trivial Lower Bounds, Information-Theoretic Arguments, Adversary Arguments, Problem Reduction, Decision Trees, Decision Trees for Sorting, Decision Trees for Searching a Sorted Array

UNIT V

Introduction to P, NP, NP-Hard and NP-Complete, P and NP Problems - Partition problem, Bin-packing problem, NP-Complete Problems

Recommended Books:

1. Introduction to Design and Analysis of Computer Algorithms, 3rd Edition, Anany Levitin, Pearson Education
 2. Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press
 3. Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI
 4. Design & Analysis of Computer Algorithms, Ullmann, Pearson
 5. Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India
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COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1 outline the basics of algorithms and data structures
CO2 interpret mathematical foundation in analysis of algorithms

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- CO3 describe the working of different algorithmic design techniques
 - CO4 compare the various algorithm design techniques
 - CO5 select appropriate algorithm design techniques for solving problems
 - CO6 design algorithms to solve real world engineering problems
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Department of Computer Science & Engineering and Information Technology

CYBER CRIME INVESTIGATIONS AND DIGITAL FORENSICS
640211

UNIT I

INTRODUCTION Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime, Social Engineering, Categories of Cyber Crime, Property Cyber Crime

UNIT II

CYBER CRIME ISSUES Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses

UNIT III

INVESTIGATION Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies, Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking

UNIT IV

DIGITAL FORENSICS Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics

UNIT V

LAWS AND ACTS Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC, Electronic Communication Privacy ACT, Legal Policies

Recommended Books:

1. Nelson Phillips and Enfinger Stewart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009
2. Kevin Mandia, Chris Prosser, Matt Pope, "Incident Response and Computer Forensics", Tata McGraw -Hill, New Delhi, 2006
3. Robert M Slade, "Software Forensics", Tata McGraw - Hill, New Delhi, 2005
4. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC — CLIO Inc, California, 2004
5. "Understanding Forensics in IT", NIIT Ltd, 2005

COURSE OUTCOMES

After completion of this course, the students would be able to

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- CO1: list various cyber crimes and various categories
 - CO2: explain different cybercrime issues and investigation techniques
 - CO3: identify various tools used in digital forensics
 - CO4: discover cyber laws and acts
 - CO5: determine the limitations imposed by data privacy laws
 - CO6: design tools for faithful preservation of data on disks for analysis
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Department of Computer Science & Engineering and Information Technology

ADVANCED TOPICS IN DATA MINING & WAREHOUSING
620212/630212/640212

UNIT I

Introduction- Motivation, Importance, Functionalities, Basic DM (Data Mining) Vs KDD, DM Applications, Data Warehousing, Evolution of Data Warehousing, Data Warehousing Concepts, Benefits of Data Warehousing, Comparison of OLTP and Data Warehousing, Data Warehousing, Data Warehousing Architecture, Distributed Data Warehouse, Problems of Data Warehousing

UNIT II

Data Pre-Processing, Data Cleaning, Missing Values, Noisy Data, Data Cleaning, Data Integration and Transformation, Data Transformation, Data Reduction, Discretization and Concept Hierarchy Generation

UNIT III

Mining Frequent Patterns, Association, Correlation, Basic Concepts, Efficient Frequent Itemset Mining Method- Apriori Algorithm, Its Variants & other Algorithms for finding Frequent Itemsets using Candidate Generation, Generating Association Rules from Frequent Itemsets, Representative Rules, Improving the Efficiency of Apriori & other Algorithms, Mining Frequent Itemsets without Candidate Generation, Mining Frequent Itemsets using Vertical Data Layout, Maximal Frequent Item Set Mining, Issue Related to the Design of Efficient & Flexible Algorithms

UNIT IV

Mining Various Kinds of Association Rules, Constraint-Based Association Mining, Classification and Prediction, Cluster Analysis, Graph Mining, Social Network Analysis, Knowledge Discovery through Statistical Techniques and Knowledge Discovery through Neural Networks, Fuzzy Technology & Genetic Algorithms

UNIT V

Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining, and Temporal Mining, Social Impacts of Data Mining, Data Mining System Products and Associated Design issues, future trends in Data Mining, Emerging Scenario of Pattern Warehousing System, Case Study -WEKA, SPSS

Recommended books:

1. Jiwei han and micheline kamber, "data mining: concept and techniques", harcourt india private limited, 2001
 2. Margaret h. Dunham, "data mining: introductory and Advanced topic" pearson education, 2003
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COURSE OUTCOMES

Handwritten signatures and initials are present below the Course Outcomes section.



After completion of this course, the students would be able to:

- CO1: explain the concepts of data warehousing and data mining
- CO2: translate the data needed for data mining using pre-processing techniques
- CO3: apply appropriate data mining methods like classification, clustering or frequent pattern mining on large data sets
- CO4: analyse advanced data mining topics like Web Mining, Spatial and Temporal Mining
- CO5: measure the performance of various data mining algorithms
- CO6: test real data sets using popular data mining tools such as WEKA, SPSS

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Department of Computer Science & Engineering and Information Technology

IMAGE PROCESSING AND RETRIEVAL TECHNIQUES
620213/630213

UNIT I

Introduction to Image Processing Systems, Digital Image Fundamentals - Image model, Relationship between Pixels, Imaging Geometry, Camera Model, Introduction to FT, DFT and FFT, Walsh Transformation, Hadamard Transformation, Histogram

UNIT II

Image Preprocessing, Images Transformations, Brightness Transformation, Geometric Transformations, Image Smoothing, Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening by Differentiation Technique, High Pass Filtering

UNIT III

Image Restoration - Degradation Models for Continuous Function, Effect of Diagonalization, on-Degradation, Algebraic approach to Restoration, Interactive Restoration, Gray Level Interpolation, Inverse & Wiener Filter, FIR Wiener Filter, Filtering using Image Transforms

UNIT IV

Image Encoding, Mapping, Quantizer and Coder, Image Segmentation, Detection of Discontinuation, Point Detection, Line Detection, Edge Detection, Boundary Extraction, Region Representation

UNIT V

Object Recognition, Pattern Recognition, Knowledge Representation, Statistical Pattern Recognition, Classification Principles, Classifier Learning, Neural Nets, Syntactic Pattern Recognition, Recognition as Graph Matching, Optimization Techniques in Recognition

Recommended Books:

1. "Digital Image Processing" by Gonzalez & Wood
 2. "Digital Image Processing" by A. K. Jain
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COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 recall the fundamental concepts of a digital image processing system
 - CO2 categorize various compression techniques
 - CO3 compare various compression techniques
 - CO4 evaluate the techniques for image enhancement and image restoration
 - CO5 interpret image segmentation and representation techniques
 - CO6 elaborate image segmentation and representation techniques
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Department of Computer Science & Engineering and Information Technology

INFORMATION SECURITY & SYSTEMS

640213

UNIT I

Security goals, security Attacks (Interruption, Interception, Modification and Fabrication), security services (Confidentiality, Authentication, Integrity, Non-repudiation, access control and Availability) and mechanisms. A model for inter-network security, Internet standards and RFCs, mathematical tools for cryptography. Introduction to number theory, prime & relative prime numbers, modular arithmetic, Fermat's & Euler's Theorems, testing for primality, Chinese remainder theorem, Discrete logarithms.

UNIT II

Conventional encryption, Principles & Algorithms (DES, AES, RC4), Block Cipher Modes of operation, Location of encryption devices, Key Distribution, public key cryptography principles, Public key cryptography Algorithms (RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key Distribution

UNIT III

Approaches for Message Authentication, Secure Hash function (SHA-512, WHIRLPOOL) and HMAC, Digital Signatures, Comparison, Process, Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures, Kerberos, X.509, Directory Authentication Services.

UNIT IV

Network Management: Basic concepts of SNMP, SNMPv1, Community facility and SNMPv3, OS Security, OS security functions, separation, memory protection, Access control, Trusted Operating system, MAC, DAC, Trusted Path, Trusted Computing Base

UNIT V

Viruses and related threats, Anatomy of virus, Virus counter-measures, Software Flaws Buffer Overflow, Incomplete Mediation, Race conditions, Malware Brain, Morris Worms, Code Red, Malware Detection, Firewalls Design Principles, Types of Firewalls, Firewall Architectures, Trusted Systems, Operating system security, Network security, security for network servers, web security and security for mobile code technologies such as Java and JavaScripts, Intrusion Detection Techniques to provide privacy in Internet Application and protecting digital content (music, video, software) from unintended use.

Recommended Books:

1. Network security essentials (Applications and Standards) by William Stallings, Pearson Education.

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2. Information security principles & Practice, Mark Stamp, WILEY INDIA, 2006.
3. Cryptography and Network security, Fourth Edition, Stallings, PHI/Pearson
4. Cryptography and Network security by Behrouz A. Forouzan, TMH 2007
5. Network Security: the complete reference, Robert Bragg, Mark Rhodes, TMH
6. Computer Security Basics by Rick Lehtinen, Deborahs Russell & G.T. Gangemi Sr. SPD O'REILLY 2006
7. Modern Cryptography by Wenbo Mao, Pearson Education 2007

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1: define computer security and basics of cryptography
 - CO2: demonstrate different data encryption algorithms and keys used during encryption techniques
 - CO3: identify the various security attacks and threats
 - CO4: analyse-evaluation criteria for AES, Triple-DES and Traffic Confidentiality
 - CO5: explain SSL and TLS, Firewall, Digital Signatures and its standards & schemes, and the enhancements made to IPv4 by IPsec
 - CO6: discuss various web security considerations
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*Syllabi
of
Departmental Elective (DE) Courses
M.Tech I Semester
(Computer Science & Engineering)*



Department of Computer Science & Engineering and Information Technology

MOBILE COMPUTING & M-COMMERCE
620114

UNIT I

Review Of Personal Communication Services (PCS), Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques

UNIT II

General Packet Radio Services (GPRS), GPRS Architecture, GPRS Network Nodes, Mobile Data Communication - Wlans (Wireless Lans), IEEE 802.11 Standard, Mobile IP, Wireless Application Protocol (WAP), Mobile Internet Standard, WAP Gateway and Protocols, Wireless Markup Languages (WML)

UNIT III

Third Generation (3G) Mobile Services, Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), And CDMA 2000, Quality Of Services In 3G.

UNIT IV

Wireless Local Loop (WLL), Introduction to WLL Architecture, WLL Technologies, Global Mobile Satellite Systems, Case Studies of IRIDIUM and GLOBALSTAR Systems, Bluetooth Technology, Wi-Fi and Wi-Max.

UNIT V

M-Commerce, Introduction, Emerging Applications, Different Players in M-Commerce, M-Commerce Life Cycle, Mobile Financial Services, Mobile Entertainment Services, Management of M-Commerce Services, Emerging Issues in M-Commerce, Future Trends in M-Commerce Services.

Recommended Books:

1. "Wireless and Mobile Networks Architecture," by Yi -Bing Lin & Imrich Chlamatic, John Wiley & Sons, 2001.
2. "Mobile & Personnel Communication Systems and Services", By Raj Pandya, Prentice Hall India, 2001.
3. "Wireless Communication- Principles and practices," 2nd Ed., Theodore S. Rappaport, Pearson Education Pvt. Ltd, 2003.
4. "Mobile communications," J. Schuller, Pearson Education Pvt. Ltd., 2002.
5. "The Wireless Application Protocol," Singhal & Bridgman et. al, Pearson Education, 2004.

COURSE OUTCOMES

After completion of this course, the students would be able to:

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- CO1 define the basic concepts and principles in mobile computing.
 - CO2 explain the concept of General Packet Radio Services, Wireless LANs, Wireless Application Protocol (WAP)
 - CO3 identify vision, services of third generation mobile communication and its quality
 - CO4 analyze the architecture, technologies inter-networking challenges and solutions in wireless local loop
 - CO5 evaluate the concepts of M-commerce for applicability to selected examples and business cases
 - CO6 discuss the services, emerging issues and future trends in M-Commerce
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Department of Computer Science & Engineering and Information Technology

ADHOC & SENSOR BASED NETWORKS

620115

UNIT I

Introduction to Mobile Adhoc Networks, Technologies for Ad Hoc Network, Issues in Ad hoc wireless Networks, IEEE 802.11 Architecture and protocols, Protocol for Adhoc Wireless Network, Issues and classification of MAC protocol.

UNIT II

Transport layer & Security protocols: Issues in designing transport layer protocols, TCP over Adhoc Wireless Networks, Network Security: Attacks and Key management

UNIT III

Wired Sensor Networks, Basic Sensor Network Architectural Elements, Applications of Sensor Networks, Comparison with Adhoc Wireless Networks, Challenges and Hurdles, Architecture of WSNs, Hardware components, Operating systems and execution environments, some examples of sensor nodes, Network Architecture, Sensor networks scenarios, Optimization goals, Design principles for WSNs.

UNIT IV

Communication protocols: Physical Layer and Transceiver design considerations in WSNs, Fundamentals of (wireless) MAC protocol, Address and name management in wireless sensor networks, Localization and positioning.

UNIT V

Routing Protocols: Dynamic Source Routing (DSR), Adhoc Distance Vector (AODV) routing, Multicasting, Routing issues, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Environment, Routing Strategies in Wireless Sensor Networks, QoS in wireless sensor networks, Coverage and deployment.

Recommended Books:

1. Ad HOC Wireless Networks: Architectures & Protocols by C.Siva Ram Murthy & BS Manoj 2nd Ed. Pearson Education.
2. Adleshesh & Gupta, "Fundamentals of Mobile and Pervasive Computing", TMH, 2005.
3. Handbook of Ad Hoc wireless network, By Mohamed Ellayas, CRC press.
4. Protocols and Architectures for Wireless Sensor Networks, By Holger Karl, John Wiley & Sons.
5. Wireless Sensor Networks Technology, Protocols, and applications by Kazem Sohraby, Daniel Minoli, Taieb Znati, John Wiley & Sons.

COURSE OUTCOMES

After completion of this course, the students would be able to

CO1: list various design and implementation issues and available solutions of mobile adhoc

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- networks.
- CO2 summarize the basics of infrastructure less networks and their importance in the future directions for wireless communications
 - CO3 model different adhoc and sensor networks
 - CO4 analyze various technologies associated with adhoc networks
 - CO5 determine various parameters associated with adhoc & sensor based networks
 - CO6 develop adhoc and sensor networks using network simulation tools.
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Department of Computer Science & Engineering and Information Technology

NETWORK SECURITY

620116

UNIT I

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, steganography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, feistel structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality

UNIT II

Introduction to group, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, ElGamal encryption

UNIT III

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS).

UNIT IV

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, Secure Electronic Transaction (SET). System Security: Intruders, Viruses and related threats, firewall design principals, trusted systems.

UNIT V

Authentication Applications: Kerberos and X 509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME. Security in WLAN: Security mechanisms: WEP, WPA, Radius, CHAP, EAP, 802.11i

Recommended Books:

1. William Stallings, "Cryptography and Network Security", Second edition, Prentice Hall, 1999
2. Atul Kahate, "Cryptography and Network Security," TMH
3. William Stallings, "Cryptography and Network Security", Third Edition, Pearson Ed

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COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1 define computer security and basics of cryptography
 - CO2 demonstrate different data encryption algorithms and keys used during encryption techniques
 - CO3 identify the various security attacks and threats
 - CO4 analyse evaluation criteria for AES, Triple-DES and Traffic Confidentiality
 - CO5 explain SSL and TLS, Firewall, Digital Signatures and its standards & schemes and the enhancements made to IPv4 by IPsec
 - CO6 discuss various web security considerations
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Department of Computer Science & Engineering and Information Technology

COMPUTER ARCHITECTURE AND PARALLEL PROCESSING
620117

UNIT I

Review, Evolution of computer architecture, Needs of parallelism, Parallelism in Uniprocessor system, Parallel Computer Structures, Pipeline computers, Array Computers, Multiprocessor Systems, Performance of Parallel computers, Dataflow and new trends, Architectural Classification schemes, Application of Parallel Processing.

UNIT II

Conditions of Parallelism, Program Partitioning and Scheduling, Program flow Mechanisms, System Interconnect Architectures, Performance metrics and Measures, Scalability, Analysis and approaches, Linear Pipeline processors, Nonlinear Pipeline processors, Instruction pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT III

Advanced processor technology, Superscalar and vector processors, Memory hierarchy technology, Bus system, Cache Memory Organization, Shared-Memory organization, Sequential and weak consistency models, Weak consistency models.

UNIT IV

Multiprocessor system interconnects, Cache coherence and synchronization mechanism, Message-passing mechanism, Vector processing principles, Multivector multiprocessors, compound vector processing, SIMD computer organizations, latency-hiding techniques, Principles of multithreading, Scalable and multithreaded architectures, Dataflow and hybrid architectures.

UNIT V

Parallel programming models, Parallel languages and compilers, Dependence analysis of data arrays, code optimization and scheduling, Loop parallelization and pipelining, Trends in parallel systems, Overview of technology, Forms of parallelism, Case studies, Cray line, Sun UltraSparc T2 processor, AMD-Opteron, Intel Pentium processors.

Recommended Books:

1. Kai Hwang & Nareah Jotwani, "Advanced Computer Architecture" TMH
2. J.P. Hayes, "Computer Architecture and Organization", MGH
3. Hwang & Briggs, "Computer Architecture and Parallel Processing", MGH
4. Kain, "Advance Computer Architecture - A System Design Approach", PHI Learning
5. M.J. Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing
6. V. Rajaraman & C.S.R. Murthy, "Parallel Computer", PHI Learning

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COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 compare the organization and operation of current generation parallel computer systems
- CO2 explain pipelining and its speed advantage and pipelined logic
- CO3 apply concept and principle of cache memory and virtual memory to high-performance computer architecture
- CO4 examine the challenges faced in the implementation of high performance system
- CO5 evaluate various multiprocessing configurations
- CO6 design the overall organization of cache and virtual memories

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*Syllabi
of
Departmental Elective (DE) Courses
M.Tech I Semester
(Information Technology)*



Department of Computer Science & Engineering and Information Technology

MOBILE COMPUTING & M-COMMERCE

630114

UNIT I

Review of Personal Communication Services (PCS), Basic concepts of cellular systems, Global system for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques

UNIT II

General Packet Radio Services (GPRS) GPRS architecture, GPRS Network nodes, Mobile Data Communication, WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP, Wireless Application Protocol (WAP) The Mobile Internet standard, WAP Gateway and Protocols, Wireless Markup Languages (WML)

UNIT III

Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G

UNIT IV

Wireless local Loop (WLL) Introduction to WLL architecture, WLL technologies, Global Mobile Satellite Systems Case studies of IRIDIUM and GLOBALSTAR systems, Bluetooth technology, Wi-Fi and Wi-Max

UNIT V

M-Commerce Introduction, Emerging applications, different players in M-Commerce, M-Commerce life cycle, Mobile financial services, Mobile entertainment services, Management of M-Commerce services, Emerging issues in M-Commerce, Future trends in M-Commerce services

Recommended Books:

1. "Wireless and Mobile Networks Architecture," by Yi-Bing Lin & Imrich Chlamatac, John Wiley & Sons, 2001
 2. "Mobile & Personnel Communication Systems and Services", By Raj Pandya, Prentice Hall India, 2001
 3. "Wireless Communication- Principles and practices," 2nd Ed., Theodore S. Rappaport, Pearson Education Pvt. Ltd, 2003
 4. "Mobile communications," J. Schiller, Pearson Education Pvt. Ltd., 2002
 5. "The Wireless Application Protocol," Singhal & Bridgman et. al, Pearson Education, 2004
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COURSE OUTCOMES

After completion of this course, the students would be able to

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- CO1: define the basic concepts and principles in mobile computing
 - CO2: explain the concept of General Packet Radio Services, Wireless LANs, Wireless Application Protocol (WAP)
 - CO3: identify vision, services of third generation mobile communication and its quality
 - CO4: analyze the architecture, technologies inter-networking challenges and solutions in wireless local loop
 - CO5: evaluate the concepts of M-commerce for applicability to selected examples and business cases
 - CO6: discuss the services, emerging issues and future trends in M-commerce
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Department of Computer Science & Engineering and Information Technology

ADHOC & SENSOR BASED NETWORKS
630115

UNIT I

Introduction to Mobile Adhoc Networks, Technologies for Ad Hoc Network, Issues in Ad hoc Wireless Networks, IEEE 802.11 Architecture and Protocols, Protocol for Adhoc Wireless Network, Issues and Classification of MAC Protocol

UNIT II

Transport Layer & Security Protocols, Issues in Designing Transport Layer Protocols, TCP over Adhoc Wireless Networks, Network Security Attacks and Key Management

UNIT III

Wired Sensor Networks, Basic Sensor Network Architectural Elements, Applications of Sensor Networks, Comparison with Ad Hoc Wireless Networks, Challenges and Hurdles, Architecture of WSNs, Hardware Components, Operating Systems and Execution Environments, Some Examples of Sensor Nodes, Network Architecture, Sensor Networks Scenarios, Optimization Goals, Design Principles for WSNs

UNIT IV

Communication protocols, Physical Layer and Transceiver Design Considerations in WSNs, Fundamentals of (wireless) MAC Protocol, Address and Name Management in Wireless Sensor Networks, Localization and Positioning

UNIT V

Routing Protocols-Dynamic Source Routing (DSR), Adhoc Distance Vector (AODV) routing, Multicasting Routing issues, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Environment, Routing Strategies in Wireless Sensor Networks, QoS in Wireless Sensor Networks, Coverage and Deployment

Recommended Books:

1. Ad HOC Wireless Networks: Architectures & Protocols by C.Siva Ram Murthy & BS Manoj 2nd Ed, Pearson Education
2. Adlesheim & Gupta, "Fundamentals of Mobile and Pervasive Computing", TMH, 2005
3. Handbook of Ad Hoc wireless network, By Mohamed Ellayas, CRC press
4. Protocols and Architectures for Wireless Sensor Networks, By Holger Karl, John Wiley & Sons
5. Wireless Sensor Networks Technology, Protocols, and applications by Kazem Solraby, Daniel Minoli, Taieb Znati, John Wiley & Sons

COURSE OUTCOMES

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- CO1 list various design and implementation issues, and available solutions of mobile adhoc networks
 - CO2 summarize the basics of infrastructure less networks and their importance in the future directions for wireless communications
 - CO3 model different adhoc and sensor networks
 - CO4 analyze various technologies associated with adhoc networks
 - CO5 determine various parameters associated with adhoc & sensor based networks
 - CO6 develop adhoc and sensor networks using network simulation tools
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Master of Technology (Cyber Security) (Semester-III) Recommended W.E.F JULY-2020

Scheme of Examination

Scheme of Examination													
S. No.	Subject Code	Subject Name	Maximum Marks Allotted					Contact Hours per week			Total Credits		
			Theory Slot		Practical Slot		MOOCs		Total Marks	L		T	P
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assign ment					
1.	640331	Dissertation Part-I (Literature Review Problem Formulation Synopsis, survey paper, etc.)	-	-	-	150	100	-	-	250	-	10	10
2.	OC	MOOC Course	-	-	-	-	-	25	75	100	-	02	02
		Total	-	-	-	150	100	25	75	350	-	12	12

MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.

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Department of Computer Science & Engineering and Information Technology

INFORMATION SECURITY & SYSTEMS
630116

UNIT I

Security Goals, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-Repudiation, Access Control and Availability) and Mechanisms. Model for Inter-Network Security. Internet Standards and Rfcs. Mathematical Tools for Cryptography. Introduction to Number Theory, Prime & Relative Prime Numbers, Modular Arithmetic, Fermat's & Euler's Theorems, Testing for Primality, Chinese Remainder Theorem, Discrete Logarithms

UNIT II

Conventional Encryption, Principles & Algorithms (DES, AES, RC4), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution, Public Key Cryptography Principles, Public Key Cryptography Algorithms (RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key Distribution

UNIT III

Approaches for Message Authentication, Secure Hash function (SHA-512, WHIRLPOOL) and HMAC, Digital Signatures, Comparison, Process, Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures, Kerberos, X.509, Directory Authentication Services

UNIT IV

Network Management, Basic Concepts of SNMP, SNMPv1, Community Facility and SNMPv3, OS Security, OS Security Functions, Separation, Memory Protection, Access Control, Trusted Operating System, MAC, DAC, Trusted Path, Trusted Computing Base

UNIT V

Viruses and Related Threats, Anatomy of Virus, Virus Counter-Measures, Software Flaws: Buffer Overflow, Incomplete Mediation, Race Conditions, Malware Brain, Morris Worms, Code Red, Malware Detection, Firewalls: Design Principles, Types of Firewalls, Firewall Architectures, Trusted Systems, Operating System Security, Network Security, Security for Network Servers, Web Security and Security for Mobile Code Technologies Such as Java and Javascripts, Intrusion Detection Techniques to Provide Privacy in Internet Application and Protecting Digital Content (Music, Video, Software) from Unintended use.

Recommended Books:

1. Network security, essentials (Applications and Standards) by William Stallings, Pearson Education.

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- 2 Information security principles & Practice, Mark Stamp, WILEY INDIA, 2006.
- 3 Cryptography and Network security, Fourth Edition, Stallings, PHI/Pearson
- 4 Cryptography and Network security by Behrouz A. Forouzan, TMH 2007
- 5 Network Security: the complete reference, Robert Bragg, Mark Rhodes, TMH
- 6 Computer Security: Basics by Rick Lehtinen, Deborah Russell & G.T. Gangemi Sr
SPD O'REILLY 2006
- 7 Modern Cryptography by Wenbo Mao, Pearson Education 2007

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 define computer security and basics of cryptography
 - CO2 demonstrate different data encryption algorithms and keys used during encryption techniques
 - CO3 identify the various security attacks and threats
 - CO4 analyse evaluation criteria for AES, Triple DES and Traffic Confidentiality
 - CO5 explain SSL and TLS, Firewall, Digital Signatures and its standards & schemes and the enhancements made to IPv4 by IPsec
 - CO6 discuss various Web Security considerations
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Department of Computer Science & Engineering and Information Technology

MODELS AND TECHNIQUES IN COMPUTER GRAPHICS

630117

UNIT I

Introduction to Computer Graphics & Graphics Systems: Random and Raster Scan Display, Scan Conversion, Line, Circle and Ellipse Generation Algorithms, Windowing and Clipping Operations, Cohen-Lad Sutherland Subdivision Line Clipping, Mid-Point Subdivision, Cyrus-Beck and Liang-Barsky Line Clipping, Polygon Clipping Algorithm.

UNIT II

3D transformations: Translation, Rotation, Scaling & other Transformations, Rotation about an Arbitrary Axis, Reflection through an Arbitrary Plane, Parallel and Perspective Projection, Computation of Vanishing Point.

UNIT III

Computations and Polygons, Point inclusion Problem, Polygon Filling, Polygon Intersection, Rendering & Visualization, Shading, Gouraud and Phong, Illumination Model, Raytracing, Color Models.

UNIT IV

Curves: Curve Representation, Parametric Cubic Curve, Parametric Bicubic Surfaces, Bezier Curves, B-Spline Curves, end Conditions for Periodic B-Spline Curves, Rational B-Spline Curves, Hidden Surface Elimination Algorithm, Z-Buffer Algorithm, Back Face Detection, Scan-Line Algorithm, Area Subdivision Algorithm.

UNIT V

Advanced Modeling Techniques: Procedural Models, Fractal Models, Grammar Based Models, Particle Systems, Animation: 3D Animation, Morphing, Simulation of Key Frames.

Recommended Books:

1. Hearn, Baker - "Computer Graphics (C version 2nd Ed.)" Pearson Education.
 2. Foley, Vandan, Feiner, Hughes - "Computer Graphics principles (2nd Ed.)" - Pearson Education.
 3. D. F. Rogers, J. A. Adams - "Mathematical Elements for Computer Graphics (2nd Ed.)" - TMH.
 4. Z. Xiang, R. Plasterock, Schaum's outlines Computer Graphics (2nd Ed.) - TMH.
 5. W. M. Newman, R. F. Sproull - "Principles of Interactive computer Graphics" - TMH.
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COURSE OUTCOMES

After completion of this course, the students would be able to

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- CO1 recall the basic concepts used in computer graphics
 - CO2 illustrate various algorithms to scan, transformations, area filling, clipping
 - CO3 apply various curve and modelling techniques
 - CO4 analyze different clipping, rasterization and hidden surface elimination algorithm
 - CO5 compare the application of various types of transformations and animation techniques
 - CO6 design applications in graphics by using various types of viewing and shading techniques.
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*Syllabi
of
Departmental Elective (DE) Courses
M.Tech I Semester
(Cyber Security)*



Department of Computer Science & Engineering and Information Technology

CYBER LAW AND EMERGING JURISPRUDENCE
640114

UNIT I

Introduction, defining Cyber Space, Cyber Law and IT Act 2000, Jurisdiction in Cyber Space, Contracts, Electronic Contracts, Cyber Contracts and Indian Legal Position.

UNIT II

Faith in Cyber World, Digital Signature and Electronic Signature, Electronic Governance, Internet Governance.

UNIT III

Cyber Crimes: Introduction to Cyber Crimes, Law Relating to Cyber Crimes, Procedural Law & Other Laws relating to Cyber-crime, Evidence Act

UNIT IV

International Laws and Cyber Crimes, Cyber Crime in International Perspective

UNIT V

Case Laws: study of Landmark Cases relating to Cyber Crime (1) Hacking (2) Obscenity-Pornography (3) Cyber Stalking (4) Cyber terrorism (5) Identity Theft.

Recommended Books:

1. The Indian Cyber law with Cyber glossary, Suresh T. Visiwanathan, New Delhi, Bharat Law House 2000.
2. Law of Cyber Crimes and Information technology law, S. V. Joga Rao, 2007
3. Cyber law, Cyber crime Internet and E-Commerce, Vinilendu Tayal,
4. Information technology law and Practice, Vakul Sharma
5. Internet Law Text and Materials, Chris Reed

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1: define the cyber space environment and operational approaches
- CO2: explain the key terms and concepts in cyber law, domain theft, intellectual property and cyber crimes
- CO3: identify computer technologies, digital evidence collection and secure governance methods
- CO4: categorize cyber laws in accordance to International perspective
- CO5: survey landmark cases related to cyber crimes
- CO6: conclude the cases based on the nature of cyber crime

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Department of Computer Science & Engineering and Information Technology

CLOUD COMPUTING AND SECURITY
640115

UNIT I

Cloud Computing: fundamental Cloud Computing definition, Cloud types: Public, Private and Hybrid clouds, Cloud Services: SaaS, PaaS, IaaS, Benefits and challenges of Cloud Computing, Business agility, benefits and challenges to Cloud Architecture, Cloud Deployment models, Cloud Applications and Development environments for service development, Amazon, Azure, Google app etc.

UNIT II

Security Concepts: Confidentiality, Privacy, Integrity, Authentication, non-repudiation, Availability, Access Control, defense in depth, Least privilege in respect to SaaS, PaaS, IaaS.

UNIT III

Infrastructure, data and storage security, Network level, Host level and Application level, Aspect of data security, Data Security Mitigation, Provider Data and its Security.

UNIT IV

Privacy concern in the Cloud, Data life cycle, changes to privacy risk management and compliance in relation to cloud computing, International laws and regulations, System security-storage consideration, Backup and recovery-virtualization, system vulnerabilities.

UNIT V

Security Management in the Cloud, Security management standards - SaaS, PaaS and IaaS, Availability management, Access Control, Data Security and Storage in the Cloud.

Recommended Books:

1. Bill Wilder, Cloud Architecture Patterns, [ISBN: 1449319777]
2. Tim Mather, Cloud Security and Privacy, [ISBN: 0396802765]
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering cloud computing

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 list different terminologies used in cloud computing
- CO2 explain the security threats and their respective prevention techniques available
- CO3 build models for addressing the security issues of cloud computing
- CO4 analyse various cloud computing models for identifying key challenges in cloud computing security
- CO5 examine the virtualization concept in installing procedure of real world cloud based applications
- CO6 discuss platform as service using available cloud of various vendors

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Department of Computer Science & Engineering and Information Technology

E-COMMERCE SECURITY
640116

UNIT I

Introduction to E-Commerce, Operating system services, Advantages and Disadvantages of E-Commerce, developer services, application services, Store Services, client Services, type of E-commerce solutions, Direct Marketing and Selling, Supply chain integration, Corporate Procurement

UNIT II

Business Models for E-commerce, E-Business Models based on Relationship of Transaction Parties, Brokerage Model, Aggregator Model, Info-mediary Model, Community Model, Value Chain Model, Manufacturer Model, Advertising Model, Subscription Model, E-Marketing - Identifying Web Presence Goals, Browsing Behaviour Model, Building Customer Relationship Based on One-to-One Marketing, E-Branding, elements of Branding, Spiral Branding

UNIT III

Electronic Data Interchange: Evolution, uses, Benefits, Working of EDI, EDI Standards (Includes Variable Length EDI Standards), Cost Benefits Analysis of EDI, Electronic Trading Networks, EDI components, File Types, EDI Services, EDI Software, Business Approach of EDI, EDIFACT (Overview, Structure, EDIFACT Software), Business Future of EDI, EDI Administration, EDI Security, Digital Signatures, Digital Certificates, Cryptography, export restrictions, Secure Socket Layer (SSL), Secure Electronic Transaction (SET), Smart Cards and its applications, WAP, WAP architecture, WAP programming model

UNIT IV

Electronic payment security, Electronic Payment systems - Electronic Commerce, Offline versus Online, Debit versus Credit, Macro versus Micro, Payment Instrument, Electronic Waller, Smart Cards, Electronic Payment Security, Payment Security Services - Payment Transaction Security, Digital Money Security, Electronic Cheque Security, Availability and Reliability, Electronic Payment Framework

UNIT V

Security on the Web and Mobile, Network and Website Security Risks, HTTP Cache Issues, HTTP Client Authentication, Web Transaction Security, Web Server Security, Web Client Security, Mobile Agent Security - mobile agent, Security Issues, Protecting Platforms from Hostile Agents, Smart Card Security, Firewall Concepts, Firewall Components, Benefits of an Internet Firewall, Enterprise - wide Security Framework, Secure Physical Infrastructure

Recommended Books:

1. E-Commerce: An Indian Perspective P. T. Joseph S. J. PHI

Handwritten signatures and initials are present below the recommended books list.



2. Electronic Commerce: Greenstein, Merylin, Tata Mc Graw Hill
3. E-Commerce Business, Technology, Society, Kenneth C. Laudon, Carol Guerico Traver, Pearson Education

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: explain the facts and ideas of e-commerce
 - CO2: compare the different business models for e-commerce
 - CO3: categorize the issues of security on the web and mobile
 - CO4: divide the electronic payment security into different payment systems
 - CO5: determine different security methods for enhancing security of web and mobile
 - CO6: elaborate the architecture of electronic data interchange
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Department of Computer Science & Engineering and Information Technology

BIOMETRIC SYSTEMS AND BIOMETRIC IMAGE PROCESSING
640117

UNIT I

Introduction, Biometric Fundamentals, Biometric Technologies, Biometrics Vs Traditional Techniques, Characteristics of a Good Biometric System, Benefits of Biometrics, Key Biometric Processes: Verification, Identification and Biometric Matching, Performance Measures in Biometric Systems, FAR, FRR, FTE, EER and ATV Rate, applications of Biometric Systems, Security and Privacy issues, Physiological Biometrics: Leading Technologies: Finger-Scan, Facial-Scan, Iris-Scan, Voice-Scan, Components, Working Principles, Competing Technologies, Strengths and Weaknesses, other Physiological Biometrics: Hand- an, Retina-Scan, Components, Working Principles, Competing Technologies, Strengths and Weaknesses, Automated Fingerprint Identification Systems

UNIT II

Behavioral Biometrics: Leading Technologies: Signature-Scan, Keystroke Scan, Components, Working Principles, Strengths and Weaknesses, Privacy and Standards in Biometrics, Assessing the Privacy Risks of Biometrics, Designing Privacy-Sympathetic Biometric Systems, Need for Standards, Different Biometric Standards

UNIT III

Fundamentals Of Image Processing: Digital Image Representation, Fundamental Steps in Image Processing, Image Enhancement: Spatial Domain Methods, Frequency Domain Methods, Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding, Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection

UNIT IV

Fingerprint Biometrics: Fingerprint Patterns, Fingerprint Features, Fingerprint Image, Width between Two Ridges, Fingerprint Image Processing, Minutiae Determination, Fingerprint Matching, Fingerprint Classification, Matching Policies

UNIT V

Iris Biometrics: Ms System Architecture: Definitions and Notations, Iris Recognition: Iris Location, Doubly Dimensionless Projection, Iris Code Comparison - Coordinate System, Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature

Recommended Books:

1. Anil K. Jain, Patrick Flynn, Arun A. Ross, 'Handbook of Biometrics', Springer, 2008.
2. Anil K. Jain, Arun A. Ross, Karthik Nandakumar, 'Introduction to Biometrics', Springer, 2011.
3. Samir Nanavati, Michael Thieme, Raj Nanavati, 'Biometrics — Identity Verification in

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- a Network World", Wiley-dreamtech India Pvt Ltd, New Delhi, 2003.
4. Paul Reid, "Biometrics for Network Security", Pearson Education, New Delhi, 2004.
 5. John R Vacca, "Biometric Technologies and Verification Systems", Elsevier Inc, 2007.
 6. David D. Zhang, "Automated Biometrics Technologies and Systems", Kluwer Academic Publishers, New Delhi, 2000.
 7. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing", Pearson Education, New Delhi, 2009.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1 define various biometric technologies along with their basic features and other parameters.
 - CO2 explain the state-of-the-art in biometric technologies and explore the currently available biometric systems.
 - CO3 identify the issues related to fingerprint and iris technology and plan a mechanism to solve them.
 - CO4 analyze the fundamental concepts of digital image processing and their applications in biometric systems.
 - CO5 compare and contrast various physiological and behavioral biometrics approaches.
 - CO6 design large scale biometric identification systems for real world security systems.
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*Syllabi
of
Open Category (OC) Course
in M.Tech
(offered under Department of CSE & IT)*



Department of Computer Science & Engineering and Information Technology

SOFT COMPUTING
620118/630118/640118

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopfield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, Defuzzification; Lambda-Cuts for Fuzzy sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Fuzzy Inference System, Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for

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Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system (ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa, Wiley
 - Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI
 - Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson
 - Neural Networks and Learning Machines-Simon Haykin PHI
 - Fuzzy Logic and Engineering Application, Timothy Ross, TMH
-

COURSE OUTCOMES

After completion of this course, the students would be able to

- CO1 define basic concepts of neural network and fuzzy systems
 - CO2 compare solutions by applying various soft computing approaches on a given problem
 - CO3 develop and train different supervised and unsupervised learning
 - CO4 classify various nature inspired algorithms according to their application aspect
 - CO5 compare the efficiency of various hybrid systems
 - CO6 design a soft computing model for solving real world problems
-

Handwritten signatures and initials are present below the course outcomes section.



Department of Computer Science & Engineering and Information Technology

BLOCKCHAIN TECHNOLOGY

620119/630119/640119

Unit -I

Introduction to Blockchain: History, Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy

Unit-II

Blockchain Architecture and Design, Basic crypto primitives: Hash, Signature, Hashchain to Blockchain, Basic consensus mechanisms

Unit-III

Consensus: Requirements for the Consensus Protocols, Proof of Work (PoW), Scalability Aspects of Blockchain Consensus Protocols, Permissioned Blockchains, Design Goals, Consensus Protocols for Permissioned Blockchains

Unit -IV

Use Case I: Blockchain in Financial Software and Systems (FSS) Settlements, KYC, Capital Markets, Insurance, Use Case II: Blockchain in Trade/Supply Chain Provenance of Goods, Visibility, Trade/Supply chain finance, Invoice Management/Discounting, etc, Use Case III: Blockchain for Government Digital Identity, Land Records and other kinds of Record Keeping between Government Entities, Public Distribution System / Social Welfare Systems

Unit -V

Blockchain Cryptography, Privacy and Security on Blockchain, Case Studies: Comparing Ecosystems - Bitcoin, Hyperledger

RECOMMENDED BOOKS

- Blockchain, Melanie Swa, O'Reilly
- Blockchain: From Concepts to Execution, Debajani Mohanty
- Zero to Blockchain, Bob Dill, David Smith

COURSE OUTCOMES

After completion of the course students would be able to

- CO1 define the basic key concepts and elements related to blockchain technology
- CO2 interpret the needs /significances of blockchain technology
- CO3 identify the requirements for the consensus protocol
- CO4 examine the privacy and security issues in blockchain
- CO5 compare various use cases of blockchain technology for performance analysis and defining application domains

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CO6 explain the importance of blockchain technology in the fields other than financial system, like trade/supply chain management and other governmental services.

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Department of Computer Science & Engineering and Information Technology

MACHINE LEARNING USING PYTHON

620120/630120/640120

COURSE OBJECTIVES:

- To learn the basic construct of python programming for implementing various Machine Learning algorithms
- To understand the basic concepts of Machine Learning
- To use Machine Learning concepts and algorithms for real-world problem solving

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, **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-

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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:

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

COURSE OUTCOMES:

After completion of this course, the students would be able to

- CO1. define basic concepts of machine learning
- CO2. summarize various concepts of python programming, data processing and visualization.
- CO3. apply machine learning algorithms to solve real world problems using python programming
- CO4. compare machine learning algorithms for applicability and performance analysis.
- CO5. assess various open source datasets and estimate the most suitable machine learning model for prediction process
- CO6. build machine learning models on open source datasets using python machine learning library

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MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
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ANNEXURE – IV

*Scheme and Syllabi
for
Two Year M.C.A. Programme
[ITEM 11(b)]*



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
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Guidelines / Abbreviations for Two Years MCA Programme (Effective from July 2020)

Abbreviations used

L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
DC	Departmental Core
DE	Departmental Elective
BM	Business Management
OC	Open Category
DLC	Departmental Laboratory Courses
MODC	Massive Open Online Courses

Definition of Credit

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical(Lab)/week	2 credit



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Master of Computer Applications (MCA) (2 Year Programme) (Semester - I) **Recommended W.E.F JULY 2020**

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Periods per week			Total Credits	
				Theory Slot			Practical Slot		MOODS						
				End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sectional	Assignment	Exam	L	T	P		
1.	BUC	600111	Mathematical Foundations	70	20	10	-	-	-	-	100	3	-	-	-
2.	DC	600112	Data Structures and Algorithms	70	20	10	-	-	-	-	100	3	1	-	4
3.	DC	600113	Database Management Systems	70	20	10	-	-	-	-	100	3	1	-	4
4.	DC	600114	Operating Systems	70	20	10	-	-	-	-	100	3	1	-	4
5.	BVI	600115	Management Functions and Oral & Written Communication Lab-I	70	20	10	-	-	-	-	100	4	-	-	5
6.	DLC	600116	Object Oriented Programming Lab-I	-	-	-	60	40	-	-	100	-	-	6	6
7.	DLC	600117	Lab-II (DBMS Lab)	-	-	-	60	40	-	-	100	-	-	2	2
Total				350	180	60	120	100	-	-	700	15	3	8	26

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Master of Computer Applications (MCA) (2 Year Programme) (Semester-II) **Recommended W.E.F JULY 2020**

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Periods per week			Total Credits	
				Theory Slot			Practical Slot		MODES		L	T	P		
				End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ semestral	Assignment	Exam					
1.	EC	680211	Software Engineering	30	20	10	-	-	-	-	100	3	1	-	4
2.	EC	680212	Internet of Things (IoT)	30	20	10	-	-	-	-	100	3	1	-	4
3.	EC	680213	Computer Networks	30	20	10	-	-	-	-	100	3	1	-	4
4.	EE	EE	Departmental Electives-I	30	20	10	-	-	-	-	100	3	-	-	3
5.	BN	DE (BN)	Departmental Electives-II (BN)	30	20	10	-	-	-	-	100	3	-	-	3
6.	DS	680221	Lab-III (Data Programming Lab)	-	-	-	80	20	-	-	100	-	-	6	6
	DS	680224	Lab-IV (Database Programming Laboratory)	-	-	-	80	20	-	-	100	-	-	2	2
			Total	150	100	80	150	100			750	15	3	8	20

Elective-I course will run through Department List of Electives, as decided by respective BSc / Department. Moreover, this may also be run through 30+434 NPTEL MOOC based Learning Platform with credit transfer facility (if required) to address the technological advancements and diverse application industries. The need is to be intimated by the respective BSc.

Elective-II course will run through Department List of Electives (for Business Management), as decided by BSc / Department.

List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.

DE-I (Elective)	
Subject Code	Subject Name
680214	Computer Architecture and Organization
680215	Computer Graphics and Multimedia
680216	Web Technology
680217	Machine Learning with Python

DE-II (BN)	
Subject Code	Subject Name
680218	Managerial Economics
680219	Corporate Planning
680220	MIS Framework and Implementation
680221	Management of Software Projects
680222	Organizational Behaviour

DEAN (ACADEMICS)
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MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Master of Computer Applications (MCA) (2 Year Programme) (Semester-III): **Recommended W.E.F JULY 2020**

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted			Theory Slot		Practical Slot		MOOC's		Total Marks	Contact Hours per week			Total Credits
				End sem. Exam.	Mid sem.	Quiz/Assign.	End sem. / Practical Viva	Practical Work / Practical Record/ Assignment etc.	Assignment	Exam				L	T	P	
1.	DC	680311	Artificial Intelligence and Applications	70	20	10	-	-	-	-	-	-	100	3	1	-	4
2.	BI	680312	Management Support Systems	70	20	10	-	-	-	-	-	-	100	3	-	-	3
3.	DC	680313	Data Mining and Warehousing	70	20	10	-	-	-	-	-	-	100	3	-	-	3
4.	DE	DE	Departmental Elective-III (MOOC)	-	-	-	-	-	-	25	75	-	100	3	-	-	3
5.	OC	OC	Open Category Course	70	20	10	-	-	-	-	-	-	100	3	-	-	3
6.	TEC	680322	Minor Project	-	-	-	80	10	-	-	-	-	150	-	-	06	06
7.	TEC	680323	Lab-V (Python Programming Lab)	-	-	-	40	40	-	-	-	-	100	-	-	04	04
Total				280	80	40	150	100	25	75	750	15	1	10	10	26	

Elective-III (MOOC) will run through SWAYAM / NPTEL. MOOC based learning platform with credit transfer facility. MOOC course will be treated as the course of open nature and will be decided by concerned department / BoS.
Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. (This course may be run through SWAYAM/NPTEL based platform with credit transfer facility and accordingly, OC pool may be revised from the list of SWAYAM/NPTEL courses)
List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.

DE-J (Tentative)	
Subject Code	Subject Name
680314	Cloud Computing
680315	Data Analytics using R
680316	Big Data Computing
680317	Deep Learning for Computer Vision
680318	Human Computer Interaction

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MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopel, M.P.)

Master of Computer Applications (MCA) (2 Year Programme) - Semester IV - **Recommended W.E.F JULY 2020**

Scheme of Examination

S.No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation					
1.	SEMINAR/SELF STUDY	600403	Self Learning Process/ Seminar	-	-	-	-	100	100	-	-	2	2
2.	DLC	600404	System Design/ Project/ Internship	-	-	-	100	200	300	-	-	20	20
Total							100	300	400			22	22

*Self Learning / presentation through SEMINAR/ SELF STUDY / Internship as a course will be compulsory for students but assessment will be based on internal/external presentation.

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*Syllabi
of
M.C.A. I Semester*



Objective:

- To understand the basic discrete mathematical structures.
- To develop understanding of boolean mathematics.
- To understand recurrence relations and its usage in computer science.

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.

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

Groups and Fields Groups, Group axioms-permutation groups, Subgroups, Cosets, Normal Subgroups, semi groups, Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial roots, applications

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

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

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

Student would be able to

CO1 understand the basic concept of set theory, lattices, graph theory, discrete numeric function and algebraic structure.

CO2 describe basic knowledge of course content and distinguish between them in terms

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of their applications

- CO3 implement the course content to related engineering applications and problems faced in real life
- CO4 apply the concepts of mathematics to the suitable technique for relevant industries and contribution to the society
- CO5 analyze the set theory, lattices, graph theory, discrete numeric function and algebraic structure to examine the real world problem
- CO6 design analytical skills and interpret applications of engineering beneficial in real time troubleshooting

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Data Structures and Algorithms 680112 (DC-I)

Objective:

- To understand the abstract data types stack, queue, deque, trees, lists etc
- To be able to design efficient algorithms using various data structures
- To understand design techniques the time complexity of algorithms

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

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 non recursive implementations, expression tree- evaluation, linked representation of binary tree-operations. Threaded binary trees, forests, conversion of forest into tree. Heap-definition.

UNIT-III

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, chaining. Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

Graphs: 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.

Trees: 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

Time Complexity: models of computation, algorithm analysis, order architecture, time space complexities, computing the average and worst case analysis.

UNIT-V

Divide and conquer: Structure of divide-and-conquer algorithms, examples, Binary search, quick sort, Strassen Multiplication, Analysis of divide and conquer run time recurrence relations. **Graph searching and Traversal:** Overview. Traversal methods (depth first and breadth first search)

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Books:

- 1 Kruse R.L. Data Structures and Program Design in C, PHI
- 2 Tennenbaum A.M. & others: Data Structures using C & C++, PHI
- 3 Horowitz & Sahney: Fundamentals of Data Structures, Galgotra Publishers
- 4 Ullman "Analysis and Design of Algorithm" TMH
- 5 Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002
- 6 Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
- 7 T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm," PHI

Course Outcomes:

Student would be able to

- CO1: describe the stack, queue, link list
- CO2: analyze worst-case running times of algorithms using asymptotic analysis
- CO3: synthesize familiar with advanced data structures such as balanced search trees, hash tables, priority queues, tree traversal techniques
- CO4: describe several sorting algorithms including quick sort, merge sort and heap sort
- CO5: organize some graph algorithms such as shortest path and minimum spanning tree
- CO6: evaluate different data structures techniques and pick an appropriate data structure for a design situation

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Database Management Systems 680113 (DC-2)

Objectives:

- To describe key concepts, issues, and operational terminology
- To understand the relationships of key components behind concepts such as hardware, networks, data storage, operating systems, and software programs
- To normalize any problem using 1st, 2nd, 3rd, 4th, 5th normal form

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

Emerging Fields in DBMS: object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers

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

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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

Course Outcomes:

Student would be able to

- CO1 differentiate database systems from file systems by enumerating the features provided by database systems and execute various SQL queries
- CO2 define the terminology, features, classifications, and characteristics embodied in database systems
- CO3 design principles for logical design of databases, including the E-R method and improve the database design by normalization
- CO4 evaluate the principles of storage structure and recovery management
- CO5 identify the issues of transaction processing and concurrency control
- CO6 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

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Operating Systems 680114 (DC-3)

Objectives:

- To learn the fundamentals of Operating Systems.
- To understand the intrinsic of basic services provided by the operating system like process management, processor management, memory management, device management and information management.
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.

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. Dettel "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.

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3. Peterson, Silberschatz. "Operating System Concepts" Addison Wesley Publishing Company, 1989
4. Tanenbaum A.S. "Modern Operating System" Prentice Hall of India Pvt Ltd. 1995.

Course Outcomes:

Student would be able to

- CO1: evaluate different structures for operating systems
- CO2: analyze theory and implementation of processes, resource control (concurrency etc.)
- CO3: distinguish system calls for managing processes, memory and the file system
- CO4: demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
- CO5: apply the various resource management techniques for distributed systems
- CO6: discover the different features of real time and mobile operating systems.

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

UNIT-I

Definition - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Trends and Challenges of Management in Global Scenario

PLANNING - Nature and purpose of planning - Planning process - Types of plans - Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making

ORGANIZING - Nature and purpose of organizing - Organization structure - Formal and informal groups organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages - Training - Performance Appraisal

UNIT-II

DIRECTING - Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity

CONTROLLING - Process of controlling - Types of control - Budgetary and non-budgetary control - Techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations

UNIT-III

Communication - Meaning, Nature, Process, Medium and Media, and Elements of Communication - Importance of Effective Communication, Communication Situation, Barriers to Communication, Communication Window, Objectives of Communication - Types of Communication - Verbal and Non-Verbal, Oral and Written, merits and demerits of Oral and written Communication, Horizontal and Vertical Communication, Formal and informal communication, Grapevine Communication, Negotiation, Utility and Styles, Creativity

UNIT-IV

Communication Skills - Listen, Speak, Read and Write, improving Communication Skills - Speaking - Presentation - Conducting - Use of Aids - Visual and Audio-visual - Group Discussion, Meetings, Interview, Telephonic Conversations, Seminar, Debates, Speech, Body Language

UNIT-V

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 Bio Data - Precise writing - Writing Reports - Mechanics of Report Writing, Types of Report, Technical Report, Organising a report - Precise Writing, Advertisement and Comprehension

Books:

- 1 - Stoner, Freeman & Gilbert Jr - Management (Prentice Hall of India, 6th Edition)

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2. Koontz Harold & Weihrich Heinz - Essentials of management (Tata Mc Graw Hill, 5th Edition 2008)
3. Robbins & Coulter - Management (Prentice Hall of India, 9th Edition)
4. Robbins S. P. and Decenzo David A. - Fundamentals of Management Essential Concepts and Applications (Pearson Education, 6th Edition)
5. Communication Skills for Engineers - Pearson Education
6. Technical Communication - Oxford University Press
7. Effective Business communication - Tata McGraw Hill
8. Business Communication - OUP, Tata McGraw
9. Practical English Grammar by Thomson Martinet - Oxford University Press
10. Study- Listening, Speaking Reading, Writing a series by Cambridge University Press
11. Communication Skills for Technical Students Farhathullah, T.M Orient Longman
12. English for Engineers & Technologists (Combined Vol. I and Vol. 2) Orient Longman

Course outcomes:

Student would be able to:

- CO1: demonstrate the roles, skills and functions of management
- CO2: analyze the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities
- CO3: demonstrate knowledge and comprehension of major text and traditions in language as well as its social, cultural, and historical context
- CO4: read a variety of text critically and analytically so as to demonstrate in written and/or speech the interpretation of those texts
- CO5: evaluate and interpret text written in English assessing the results in written and oral arguments using appropriate material for support
- CO6: develop professional work habits including those necessary for effective collaboration and cooperation with others

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Object Oriented Programming Lab
680116 (DLC-1)

Data Types, Constant & Variable, Operators & expressions, Priority & associativity 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.

Course outcomes:

Student would be able to

- CO1. Adhere to object oriented programming constructs
- CO2. Implement inheritance, polymorphism, encapsulation, abstraction
- CO3. Modify existing codes and classes as per the requirement of software development
- CO4. Construct programming solutions to a broad range of query problems
- CO5. Develops object oriented application system as part of a team in industry
- CO6. Design the classes and constructs for real time software as per societal needs

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Database Management Laboratory
680117 (DLC-2)

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, NOT EXISTS, 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.

Course outcomes:

Student would be able to:

- CO1 Design database application system as part of a team.
- CO2 Solve queries using SQL.
- CO3 Design an information model expressed in the form of an entity relation diagram.
- CO4 Adapt normalization theory for a database.
- CO5 Implement data definition language for the schema using a DBMS.
- CO6 Construct database application system solutions to a broad range of query problems.

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*Syllabi
of
Departmental Core (DC) Courses
M.C.A. II Semester*



Software Engineering 680211 (DC-4)

COURSE OBJECTIVES

- To understand the basic concepts of software engineering logical process modeling and operational terminology
- To understand the software process models
- To draw DFDs using specific rules and components to depict logical process models

UNIT - I Introduction to Software Engineering:

Definition, Software Characteristics and Elements of system, The System Development Life Cycle, The Role of System Analyst, Types of Requirement-Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management

UNIT - II Software Process Models:

Software, Software Myths, Software Engineering - A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Fourth Generation Techniques

UNIT - III Design Concept, Principle and Methods:

Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Real Time Design, Object Oriented Design, Coupling and Cohesion, Risk analysis

UNIT - IV Software Metrics, Project Management and Estimation:

Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques

UNIT - V Software Quality Assurance and Testing:

Definitions, Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation, Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing

BOOKS

- Software Engineering by Sommerville, Pearson
- Software Engineering- A Practitioner's Approach, by Roger S. Pressman, McGraw Hill
- Software Engineering by K.K. Agrawal & Yogesh Singh, New Publication
- Software Engineering by Rajib Mall

Course Outcomes:

After completion of this course, the students would be able to

- CO1: design and mapping of different real world problems using software engineering concepts

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- CO2: evaluate software models with respect to their accuracy and needs of the customer requirement
- CO3: design test cases and SQA of a software system
- CO4: identify and how to use various cost estimation techniques used in software engineering
- CO5: design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- CO6: evaluate as an effective member or leader of software engineering teams and manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals
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Internet of Things
680212 (DC-5)

Unit I

Introduction & Concepts: Introduction to Internet of Things, Architecture, Physical Design of IOT, Logical Design of IOT, Four Pillars of IoT, Applications, IOT Enabling Technologies, IOT components, Basics of Networking

Unit II

Sensors, actuators, types of sensors, IOT service oriented Architecture, IOT associated technologies, IOT Communication Protocols: IEEE 802.15.4, Zigbee, 6LoWPAN, Wireless HART, AMQP, MQTT, COAP, NEC, XMPP, SOAP, REST, HTTP Routing protocols

Unit III

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Introduction to Raspberry Pi, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Raspberry Pi & Arduino devices

Unit IV

Sensor Networks, Ubiquitous Computing, data storage in IOT, IOT Cloud Based Services, Interoperability in IoT, cloud Computing, Fog Computing, Edge computing, Data Analytics overview

Unit V

Security and privacy in the internet of things: concepts, IoT security overview, security framework for IoT, Privacy in IOT networks, IoT Robustness and reliability, governing internet of things: issues, Approaches and new paradigms, IOT Case studies: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style

Books:

1. Rajkamal, "Internet of Things", Tata McGraw-Hill publication
2. Vijay Madisetti and Arshdeep Bahga, "Internet of things (A-Hand-on-Approach)" 1st Edition, Universal Press
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication
4. Charles Bell "MySQL for the Internet of things", Apress publications
5. Francis dacosta "Rethinking the Internet of things: A scalable Approach to connecting everything", 1st edition, Apress publications 2013
6. Donald Norris "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication

Course Outcomes:

- CO1: Define fundamentals of IoT, Enabling Technologies, Networking and Communication Protocols
- CO2: Illustrate the functions, applications of various IOT Protocols and architectures

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- CO3: Make use of networking knowledge in Domain Specific IOTs for societal benefits
- CO4: Discover technologies and theories involved in Sensor Networks, Machine-to-Machine Communications & Arduino Programming
- CO5: Evaluate the role of Security and privacy in the internet of things to provide solutions related to reliability and privacy for real world problems
- CO6: Develop IoT design methodologies using Python constructs and Raspberry Pi

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Computer Networks 680213 (DC-6)

Objectives:

- To introduce students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)
- To acquire Familiarity with the basic protocols of computer networks and how they can be used to assist in network design and implementation

UNIT-I

Introduction: Layered Networks Architecture, Review of ISO-OSI model, Data Communication techniques pulse code modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), transmission media wires cables, radio links, satellite links, fiber-optic links, error detection, parity check codes, cyclic redundancy codes, & Hamming code

UNIT-II

Multiplexing and DLC Preliminaries: Multiplexing techniques Frequency division, time division, statistical time division multiplexing, multiplexing hierarchies. **DLC Preliminaries:** Stop and wait protocols, Noise free and noisy channels, performance and efficiency, sliding window protocols, Go back and selective repeat

UNIT III

Data Link Protocols:

HDL, data link protocol, Integrated services digital networks, interfaces, Devices, Channel structure, Asynchronous transfer mode (ATM) cells, header and cell formats, Layers in ATM, Class 1, 2, 3, 4 traffic

FDDI, token bus, token ring, Reservation, polling, Multiple access protocols, Concept of random access Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA

UNIT-IV

Network Layer Protocols: Design issues, Virtual Circuits and Datagram, Internetworking & devices, Repeaters, Hubs, Bridges, Switches, Router, Gateway, Addressing, Internet address, classful address, subnetting, Routing techniques, static vs. dynamic routing, routing table for classful address, Routing algorithms, Optimality principle, Shortest path routing - Dijkstra, bellman-ford and floyd warshall algorithms, flooding and broadcasting, distance vector routing, link state routing, flow based routing, multicasting, routing

UNIT-V

Transport Layer Protocols and Congesting Control: General principles of congestion control, window flow control, packet discarding, Isarithmic control, traffic shaping, choke packets, Leaky bucket algorithm, Token bucket algorithm, choke packets, Connection Management, Addressing, Connection Establishment and releases, flow control and buffering, multiplexing, crash recovery in TCP

Presentation and Application Layer Protocols: Presentation concepts, Cryptography, Substitution and transposition, ciphers, data encryption standard (DES), DES chaining,

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breaking DAS, public key cryptography, RSA, authentication protocols

Books:

1. A.S. Tanenbaum, "Computer Networks", Second Ed., Prentice Hall India (tan)
2. J.F. Hayes, "Modeling and Analysis of Computer Communication Networks", Plenum press
3. D. Bertsekas and R. Gallager, "Data Networks", Second Ed. Prentice Hall, India
4. D.E. Comer, "Internetworking with TCP/IP", vol. 1, prentice Hall India
5. G.E. Keiser, "Local Area Networks", McGraw Hill, international Ed
6. W. Stalling, "Data & Computer Communications", Maxwell Macmillan international Ed.

Course Outcomes:

Student would be able to

- CO1: describe various data communication techniques, OSI reference model, the TCP/IP reference model and other basics in data communication and networking. (Understanding)
- CO2: discuss some medium access protocols (like, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD etc), some Modern topics (like ISDN services, ATM) (Understanding)
- CO3: examine various multiplexing techniques, error detection & correction methods, flow control methods and other concepts of computer networks to achieve required networking results as per standards. (Analyzing)
- CO4: illustrate different types of network devices and their functions within a network, Internetworking devices, Routing concepts, techniques and protocols and other concepts of computer networks (Applying)
- CO5: evaluate various congestion prevention, avoidance and control mechanisms and other concepts of computer networks (Evaluation)
- CO6: justify the use of cryptography, security and networking techniques and other concepts of computer networks for providing better network/applications in society. (Evaluation)



*Syllabi
of
Departmental Elective (DE-I) Courses
M.C.A. II Semester*



Computer Architecture and Organization 680214 (DE-I)

Objectives:

- To introduce basic concepts of computer organization
- To understand the architecture of modern computer
- To understand different instruction types
- To illustrate the computer organization concepts by Assembly Language programming
- To teach Assembly language programming
- To understand how a computer performs arithmetic operation of positive and negative numbers
- To understand how computer stores floating point numbers in IEEE 754 standard
- To understand how cache mapping occurs in computer

UNIT-I

Representation of Information: Number, integer and floating-point representation, character codes (ASCII, EBCDIC), Error detection and correction codes. Basic Building Blocks: Boolean Algebra, combinational blocks gates, multiplexers, decoders etc, Sequential building blocks flip-flops, registers, counters, ALU, Random access memory etc

UNIT-II

Register Transfer Language and Micro-operations: concept of bus, data movement among registers, language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer, timing in register transfer

UNIT-III

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction execution in terms of microinstructions, concepts of interrupt and simple I/O organization, implementation of processor using the building blocks

UNIT-IV

Assembly Language programming: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, conditions and procedures, arithmetic operations in assembly language, illustrations using typical programs like table search, subroutines, symbolic and numerical manipulations and I/O

UNIT-V

Memory organization: basic cell of static and dynamic RAM, Building large memories using chips, associative memory, cache memory organization, virtual memory organization

Books:

1. M. Morris Mano, "Computer System Architecture", PHI, 3rd edition, 1993
2. Liu and Gibson, "8086/8088 Microprocessor Assembly Language"
3. Batee, "Digital Computer Fundamentals"
4. Malvino, "Digital Computer Electronics"

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Course Outcomes:

Student would be able to

- CO1: Analyze computer hardware at abstract level
- CO2: Design the Instruction execution stages
- CO3: Differentiate between High level languages and machine language
- CO4: Depict storage of positive and negative number at hardware level
- CO5: Design Assembly language programs
- CO6: Solve various problems related to secondary storage organization and utilization of cache memory

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Computer Graphics and Multimedia 680215 (DE-I)

Objectives:

- To identify and explain the core concepts of computer graphics
- To apply graphics programming techniques to design and create computer graphics scenes
- To understand the basics of multimedia data, video data and audio data

UNIT-I

Introduction: Basics of computer graphics, Graphics hardware and software, DDA and Bresenham's line drawing algorithm, antialiasing, circle generation, Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill flood fill algorithm, attributes of output primitives line attributes, area fill attributes, character attributes

UNIT-II

Two-dimensional Transformations: Translation scaling rotation reflection shear, matrix representation and homogeneous coordinate's composite transformation commands Viewing coordinates window, view port, clipping, window to view transformation line clipping Cohen Sutherland algorithm polygon clipping Sutherland-hodgeman algorithm.

Unit-III

Three-dimensional concepts: Three dimensional viewing, three dimensional object presentation polygons, curved line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, bezier's methods, B-splining methods, three dimensional transformation Translation, scaling composite transformation, rotation, about arbitrary axis, projection parallel, perspective

UNIT-IV

Introduction to multimedia: Introduction to multimedia, multimedia and hypermedia, Multimedia hardware, analog media devices, digital media devices, MIDI, RAID, CD-ROM standards, Multimedia software Multimedia operating systems, multimedia databases, multimedia software tools.

UNIT-V

Video Data: Video representation and operations on video data type, YUV, YIQ and YCbCr Color models, analog to digital video conversion, Basic video compression schemes, H.261 Video, H.263, MPEG-1 and MPEG-2 Video compression standards.
Sound and Audio: Digitization of sound, Signal-to-Noise Ratio (SNR), Linear and non linear quantization, audio filtering, MIDI Hardware aspects, structure of MIDI, MIDI to wav conversion, Quantization and transformation of audio Pulse code modulation, differential coding, DPCM, DM and ADPCM, audio formats.

Books:

1. D Hearn and M.P. Baker Computer Graphics (2nd ed), PHI
2. S Harrington-Computer Graphics-a Programming approach (2nd ed) McGrawhill
3. New Mann & Sprout - Principles of interactive computer graphics (2nd ed) McGrawhill
4. Multimedia Computing, communications and applications Ralf Steinmetz and Klara Nahrstedt, Pearson Education
5. Multimedia Systems Design: Prabhat K. Andleigh and Kiran Thakrar, PHI

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6. Multimedia Systems: John F.K. Buford, Pearson Education

Course Outcomes:

Student would be able to

- CO1 analyze the structure of an interactive computer graphics system
- CO2 apply geometrical transformations, interaction techniques and 2D viewing
- CO3 demonstrate use of modern 3D computer graphics techniques, models, and algorithms to solve graphics problems
- CO4 incorporate and operate various multimedia object and technology
- CO5 analyze various compression schemes
- CO6 analyze various audio formats

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Web Technology 680216 (DE-I)

Objectives:

- understand best technologies for solving web client/server problems
- analyze and design real time web applications
- use Java script for dynamic effects and to validate form input entry
- Analyze to Use appropriate client-side or Server-side applications

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, Object Oriented Programming with PHP

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

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 Bas, Michael Ekedahl, CENAGE Learning, India edition
4. An Introduction to Web Design + Programming, Paul S Wang, India Edition

Course Outcomes:

Student would be able to

- CO1: evaluate web application architecture, technologies and frameworks
- CO2: integrate java and server side scripting languages to develop web applications
- CO3: debug, test and deploy web applications in different web servers
- CO4: apply the knowledge of web technology in developing web applications
- CO5: implement small to large scale project to provide live solution in web application development fields
- CO6: evaluate different solutions in field of web application development



Machine Learning with Python 680217 (DE-I)

Objectives:

- To learn the basic construct of python programming for implementing various Machine Learning algorithms
- To understand the basic concepts of Machine Learning
- To use Machine Learning concepts and algorithms for real-world problem solving

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 Metrics: Mean Squared Error (MSE), Root-Mean-Squared-Error (RMSE), Mean-Absolute-Error (MAE), R^2 or Coefficient of Determination, Multivariate Regression, Applications of Regression 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.

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available on Kaggle and UCI Repositories using Python Machine Learning Library
Scikit-Learn

Books:

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

Course Outcomes:

After completion of this course, the students would be able to

- CO1. define basic concepts of machine learning.
- CO2. summarize various concepts of python programming, data processing and visualization.
- CO3. apply machine learning algorithms to solve real world problems using python programming.
- CO4. compare machine learning algorithms for applicability and performance analysis.
- CO5. assess various open source datasets and estimate the most suitable machine learning model for prediction process.
- CO6. build machine learning models on open source datasets using python machine learning library.





*Syllabi
of
Departmental Elective (DE-II) Courses
M.C.A. II Semester*



Managerial Economics
6802018 (DE-II (BM))

UNIT-I

Meaning, nature and scope of managerial economics, difference and similarities between micro-economics and macro-economics, objectives of firm, Profit maximization theory, alternative theories and behavioral theories of the firm.

UNIT-II

Economic Principles, concepts of opportunity cost, marginal cost, incremental, time perspective, principles of discounting and equi-margin.

UNIT-III

Consumer behaviour-demand analysis purpose and concepts of demand, doctrine of diminishing utility, elasticity of demand, price elasticity, income elasticity and cross elasticity, demand forecasting.

UNIT-IV

Product and cost analysis, short run and long run average cost curves, Law of supply, economies and diseconomies of scale, law of variable proportions, Production functions, single output isoquants.

UNIT-V

Pricing, prescriptive approach, price determination under perfect competition, monopoly, oligopoly and monopolistic competition, methods of pricing, pricing strategies, Profits, nature and measurement, policy, break even analysis, case study.

Books

1. Dean J. Managerial Economics PHI, New Delhi.
2. Motilal V.L. et al Management Economics Concepts and Cases TMH, New Delhi.

Course outcomes:

Student would be able to

- CO1: Develop an understanding of management and its uses in day to day life.
- CO2: The aware students about each and functions of management and to understand the ability to understand how management serves as a guideline to sustain in professional life.
- CO3: Develop an understanding of professional and ethical responsibilities so as to analyze and solve contemporary issue.
- CO4: Relate the subjects of arts and management in engineering and allied fields.
- CO5: Understanding as to how management helps a student to understand, adjust and adapt to the world around us.
- CO6: Enhance the understanding of economics and its impact on organization.

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Corporate Planning 680219 (DE-II (BM))

Unit 1: Introduction to Strategies Introduction, Fundamentals of Strategy, Conceptual Evolution of Strategy, Scope and Importance of Strategies, Purpose of Business, Difference between Goals and Objectives of Business, Strategic Intent through Vision and Mission Statements, Core Competencies of Business

Strategic Management Introduction, Strategic Management, Need, scope, key features and importance of strategic management, Role of Strategists in Decision Making, strategists at various management levels, Types of Strategies, Limitations of Strategic Management

Unit 2: Strategy Analysis Introduction, Strategy Analysis and its Importance, Environmental Appraisal and Scanning Techniques, Organisational Position and Strategic Advantage Profile, Strategic Management Model

Strategy Formulation and Implementation Introduction, Strategy Formulation, Process in Strategy Formulation, Strategy Implementation and its Stages, Reasons for Strategy Failure and Methods to Overcome, Strategy Leadership and Strategy Implementation, Strategic Business Units (SBUs)

Unit 3: Strategic Control and Evaluation Introduction, Strategy Evaluation, Strategic Control, Difference Between Strategic Control and Operational Control, Concept of Synergy and its Meaning, Key Stakeholder's Expectations

Business Policies Introduction, Overview of Business Policies, Importance of Business Policies, Definitions of Policy, Procedures, Process and Programmes, Types of Policies, Business Policy Statements, Corporate Culture

Unit 4: Strategies for Multinational Corporations Introduction, Multinational Corporations (MNCs), Benefits of MNCs, Limitations of MNCs, Business Strategies of MNCs, Techniques Employed by MNCs to Manage Markets, MNC, TNC and Global Companies, Strategic Alliances Introduction, Strategic Alliances, Types of Strategic Alliances and Business Decisions, Problems Involved in Strategic Alliances

Unit 5: Role of Creativity and Innovation in Business Introduction, Creativity, Innovation, Creating and Building Creative and Innovative Business Culture, Business Practices Adopted to Promote Creativity and Innovation, Importance of Creativity and Innovation in Business, Challenges Involved in Creativity and Innovation

Business Ethics and Corporate Social Responsibility Introduction, Ethics and Values, Ethical Conduct and Unethical Conduct, Impact of Ethical Conduct, Corporate Social Responsibilities (CSR), Business obligations, Social Audit and Corporate Governance

Books:

1. Business Policy - Azhar Kazmi - S. Chand & Co. New Delhi
2. Strategic Management: Concepts & Cases - Upendra Kachru, Excel Bppks
3. Strategic Planning: Formulation of Corporate strategy - V.S. Ramaswamy, S. Namakumari - Macmillan Publishing House Ltd
4. Management Policy & Strategic Management - R. M. Shrivastava, Himalaya Publishing House, Mumbai
5. Creating Excellence - Craig R. Hickman & Michael A. Silva - London Universal Book Stall, New Delhi

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Course Outcomes:

- CO1 Describe major theories, background work, concepts and research output in the field of strategic management
- CO2 Demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature
- CO3 Demonstrate effective application of concepts, tools & techniques to practical situations for diagnosing and solving organisational problems
- CO4 Demonstrate capability of making their own decisions in a dynamic business landscape
- CO5 Develop their capacity to think and execute strategically
- CO6 Select and apply current technologies to support an organization's integrative trade initiatives

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MIS Framework and Implementation
680220 (DE-II (BM))

Course Objective:

- Understand the role of the information systems (IS) function in an organization
- Develop an insight as to how information systems influence business strategy
- Develop the ability to contribute meaningfully towards information system selection

Unit I

An overview MIS definition of MIS, MIS as an evolving concept, MIS and other academic disciplines, subsystems of an MIS, operating elements of an information system, MIS support for decision making

Unit II

Management information system structure based on management activity, hierarchy of Management activity, information systems for operation control, information system for management operation control, information system for strategic planning

Unit III

Based on organizational function: sales and marketing subsystem, production subsystem, logistics subsystem, personnel subsystem, financial and accounting subsystem, information processing subsystem, top management subsystem, synthesis of MIS structure, some issues in MIS

Unit IV

Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organization for development of MIS, MIS development process model

Unit V

Planning fundamentals (real world cases), Organizational planning, planning for competitive advantage, (SWOT Analysis), Business models and planning, Business/IT planning, identifying business/IT strategies, Implementation Challenges, Change management, Developing business systems, (real world case), SDLC, prototyping, System development process, implementing business system

Books :

1. Gordon B. Davis and Margrethe H. Olson, Management Information Systems - Conceptual Foundation, Structure and Development, McGraw Hill
2. D. P. Goyal, Management Information Systems, McMillan E. M. Awad, system
3. System Analysis and Design, E. M. Awad

Course Outcomes:

- CO1 define fundamental concepts of MIS framework, elements, challenges encountered in implementation and role of MIS in decision making
- CO2 summarize the organizational functions of various subsystems and issues involved in MIS
- CO3 identify the need of MIS structure, hierarchy of Management activity and

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information system for strategic planning to provide benefits to business organizations.

- CO4 analyze various business/IT strategies and Business models to improve business systems using MIS
- CO5 evaluate the role of management of information quality in the MIS, implementation Challenges and System development process
- CO6 develop business plans, strategies and models using MIS framework to find solutions for real world cases

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Management of Software Projects
680221 (DE-II (BM))

Unit 1 – Overview of Project Management: Project Management – Definitions, Factors Influencing Project Management – Project Manager, Project Management Activities, Stakeholders, Project Communication, Project Development Phases, Project Charter, Statement of Work (SoW), Project Management Associations

Unit 2- Planning a Software Project: Project Plan, guidelines for Software planning, Tasks in Project Planning, Work Breakdown Structures (WBS), Planning Methods, Development Life Cycle Models, Estimation and Budgeting of Projects, Software Cost Estimation, COCOMO Model, Budgeting

UNIT 3- Project Scheduling: Scheduling Techniques – Program Evaluation and Review Technique (PERT), Gantt Chart, Critical Path Method (CPM), Automated Tools, Project Monitoring and Controlling, Project Status Reporting, Project Metrics, Earned Value Analysis (EVA), Project Communication Plan & Techniques, Steps for Process Improvement

UNIT 4- Risk Management: Concepts of Risks and Risk Management, Risk Management Activities, Effective Risk Management, Risk Categories, Aids for Risk Identification, Potential Risk Treatments, Risk Components and Drivers, Risk Prioritization

UNIT 5-Software Maintenance: Fundamental of software maintenance, types of software maintenance, strategies, and maintenance of object oriented system design

CASE, tools and Environment: Concept, scope of CASE, classification of CASE tools, categories of CASE environment

Communication & Business technical reports: Role of communication in s/w project management & its type's, Various Types of Reports according to different phases of SDLC

Books :

1. Software Engineering: A Practitioner's Approach, Pressman Roger, Tata McGraw Hill
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa Pub
3. Bob Hughes and Mike Cotterell "Software Project Management", Third Edition, Tata McGraw- Hill
4. Project Management - "Harold Kerzner"
5. Basics of software Project Management, Nit, Prentice-Hall India, 2004
6. Jalote Pankaj, Software Project Management In Practice, Pearson Education

Course Outcome

- CO1: define fundamental concepts of software project management and related factors, activities, maintenance etc.
- CO2: demonstrate the role and need of risk management in software project management

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- CO3 apply the fundamental knowledge of Project Management to improve overall performance of software projects
- CO4 analyze techniques of Project Scheduling and Project Monitoring & Controlling
- CO5 evaluate the role of Communication & Business technical reports and case tools in project management
- CO6 develop project plan for software project by using guidelines of Software planning, structures, Planning Methods and Budgeting principles



**Organizational Behaviour
680222 (DE-II (BM))**

COURSE OBJECTIVES

- To help the students to develop cognizance of the importance of human behaviour
- To enable students to describe how people behave under different conditions and understand why people behave as they do
- To provide the students to analyse specific strategic human resources demands for future action
- To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results

UNIT - I

Organizational Behavior Today What is Organizational Behavior, shifting paradigms of organizational behavior—organizational behavior and diversity Learning about Organizational Behavior Organizational Behavior and learning imperative scientific Foundations of organizational behavior

UNIT - II

Challenge and Opportunities for organizational behavior Towards improving quality & productivity, improving people skills from management control to empowerment, from sterility of flexibility, Improving ethical behavior, organizational social responsibility work and quality of life

UNIT- III

A Micro Perspective of Organizational Behavior The perception process, personality and attitudes, motivation motivating performance through job design and goal setting, learning processes towards systems and behavior management

UNIT - IV

Micro and Macro Dynamics of Organizational Behavior Group dynamics and teams, interactive conflict and negotiation skills, stress cause effects and coping strategies, leadership styles, activities and skills A Macro Perspective of Organizational Behavior Communications, decision-making, Organizational Theory & Design, Organizational Culture

UNIT - V

Horizons for Organizational Behavior International Organizational Behavior (IOB), the impact of culture on IOB, Communication in IOB, motivation across culture, managerial leadership across cultures Organizational Change & Development Learning objectives, the changes facing organizations, managing change and organizational development, future of organizational Behavior

Books:

1. Fred Luthans "Organizational Behavior", McGraw Hills International Edition, Management & Organization series
2. Schermerhorn, Hunt & Osborn "Organizational Behavior" (7th Edition), John Wiley & Sons Inc
3. Stephen P. Robbins "Organizational Behavior: Concepts controversies applications", PHI publications
4. A.J. Robertson Lyan T. and Cooper, Cary L. "Work Psychology Understanding Human Behavior in the workplace" Macmillan India Ltd Delhi 1996
5. M.N. Mishra "Organizational Behavior", Vikas Pub. Co. Note: Paper is to be set unit

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Course Outcomes:

- CO1 to be familiarized with various aspects of organizational behavior, personality and attitude, perception, motivation etc
- CO2 describe and assess the basic design elements of organizational structure and evaluate their impact on employees
- CO3 demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization
- CO4 demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization
- CO5 analyze the complexities associated with management of the group behavior in the organization
- CO6 demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.



Java Programming Lab
680223 (DLC-3)

Basics: Data types, Operators- precedence and associativity, Type conversion, decision making – if, if else, switch, loops – for, while, do while, special statements–return, break, continue, labeled break, labeled continue, Modular programming methods, arrays, memory allocation and garbage collection in java keywords

Class, Packages, scope and lifetime, Access specifier, Constructors, Copy constructor, this reference, finalize () method, arrays, Memory allocation and garbage collection in java keywords, variable argument list, command line arguments, super keyword

Basic idea of multithreaded programming, The lifecycle of a thread, Creating thread with the thread class and runnable interface, Thread synchronization, Thread scheduling, Producer-consumer relationship, Daemon thread, Selfish threads, Basic idea of exception handling, The try, catch and throw, throws Constructor and finalizers in exception handling, Exception Handling.

Applet security restrictions, the class hierarchy for applets, Life cycle of applet, HTML Tags for applet.

Course outcomes:

Student would be able to

- CO1: apply the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
- CO2: implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- CO3: demonstrate the ability to use simple data structures like arrays in a Java program.
- CO4: make use of members of classes found in the Java API (such as the Math class).
- CO5: demonstrate the ability to employ various types of selection constructs in a Java program.
- CO6: employ a hierarchy of Java classes to provide a solution to a given set of requirements.





Business Programming Laboratory
680224 (DLC-4)

This course is an introduction to basic concepts of business modelling and underlying technologies for implementing the business practices. In this emphasis is on developing business and commercial applications in stand-alone mode or as android based applications. Student may be exposed the process of app development for business applications. Emphasis is placed on the implementation of programs with procedural structures, along with graphical user interfaces and event-driven code. Upon completion, students should be able to design, code, test, and debug programs based on business requirements using a selected programming language.

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ANNEXURE V

*Syllabus of Newly Proposed Course
in the Existing Scheme of III Semester
(M.C.A. Programme)
[ITEM 11(C)]*

Programming in Python (6803011)

- **Unit 1 - Introduction to Python:** Data Types, Variables, Basic Input-Output Operations, Basic Operators Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations, Python literals, Operators - data manipulation tools, Variables - data-shaped boxes, How to talk to computer?, Making decisions in Python, Python's loops, Logic and bit operations in Python, Lists - collections of data, Sorting simple lists - the bubble sort algorithm, Lists - some more details, Lists in advanced applications.
- **Unit 2 - Functions, Tuples, Dictionaries, and Data Processing Modules, Packages, String and List Methods, and Exceptions:** Writing functions in Python, How functions communicate with their environment?, Returning a result from a function, Scopes in Python, Let's make some fun - sorry, functions, Tuples and dictionaries, Using modules, Some useful modules, What is package?, Errors - the programmer's daily bread, The anatomy of exception, Some of the most useful exceptions, Characters and strings vs. computers, Python's nature of strings, String methods, Strings in action, Four simple programs.
- **Unit 3 - The Object-Oriented Approach:** Classes, Methods, Objects, and the Standard Objective Features, Exception Handling, and Working with Files, Basic concepts of object programming, A short journey from procedural to object approach, Properties, Methods, Inheritance - one of object programming foundations, Exceptions once again, Generators and closures, Processing files, Working with real files.
- **Unit 4: Regular expressions, CGI, Multithreading:** Match function, Search function, Matching VS Searching, Modifiers, Patterns, Introduction, Architecture, CGI environment variable, GET and POST methods, Cookies, File upload, Thread, Starting a thread, Threading module, Synchronizing threads, Multithreaded Priority Queue.
- **Unit 5: Database connectivity & Network Programming through Python:** Introduction, Connections, Executing queries, Transactions, Handling error, Socket, Socket, Module, Methods, Client and server, Internet modules.

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. VIII Semester (Computer Science & Engineering) for batch admitted in Academic Session 2017-18

S.E. SEM. VIII Semester (Computer Science & Engineering) for batch admitted in Academic Session 2017-18																
S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	
				Theory Slot		Practical Slot		MOOCs				L	T	P		
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem. & Sessional	Assignment	Exam							
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	100	2	-	-	2
2.	OC	OC	Open Category * (OC-4)	-	-	-	-	-	-	25	75	100	2	-	-	2
3.	OC	OC	Open Category * (OC-5)	-	-	-	-	-	-	25	75	100	2	-	-	2
4.	150801	DLC	Internship/Project (DLC-9)	-	-	-	250	150	-	-	-	400*	-	-	6	3
5.	150802	-	Professional Development [#]	-	-	-	-	50	-	-	-	50	-	-	2	1
Total				-	-	-	250	200	75	225	750	6	-	8	-	10
Additional Courses for obtaining Honours or minor Specialization by desirous students				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization												
*All of these courses will run through SWAYAM/NPTEL/MOOC																

*All of these courses will run through SWAYAM/NPTEL/ MOOC

* Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)

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DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. VIII Semester (Information Technology)

for batch admitted in Academic Session 2017-18

for batch admitted in Academic Session 2017-18															
S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot		Practical Slot	MOOCs		L	T		P			
				End Sem. Exam	Mid Sem. Exam		Quiz/ Assignment	End Sem.			Lab Work & Sessional		Assignment	Exam	
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	2	-	-	2
2.	OC	OC	Open Category* (OC-4)	-	-	-	-	-	-	25	75	2	-	-	2
3.	OC	OC	Open Category* (OC-5)	-	-	-	-	-	-	25	75	2	-	-	2
4.	160801	DLC	Internship/Project (DLC-9)	-	-	-	250	150	-	-	-	400	-	6	3
5.	160802	-	Professional Development [†]	-	-	-	-	50	-	-	-	50	-	2	1
Total				-	-	-	250	200	75	225	750	6	-	8	10
Additional Courses for obtaining Honours or minor Specialization by desirous students				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization											

*All of these courses will run through SWAYAM/NPTEL/ MOOC

[†] Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)


 DEAN (ACADEMICS)
 MITS
 GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B.Tech. VI Semester (Computer Science & Engineering)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)																
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	
				Theory Slot			Practical Slot		MOOCs			L	T	P		
				End Sem.	Mid Sem Exam.	Quiz/Assign ment	End Sem.	Lab work & Sessional	Assign ment	Exam						
1.	150601	DC	Compiler Design (DC-12)	70	20	10	30	20	-	-	150	2	1	2	4	
2.	150602	DC	Computer Networks (DC- 13)	70	20	10	-	-	-	-	100	4	-	-	4	
3.	150603	DE	DE-1	70	20	10	-	-	-	-	100	4	-	-	4	
4.	150604	DE	DE-2 ^o	-	-	-	-	-	25	75	100	4	-	-	4	
5.	150605	OC	OC-1	70	20	10	-	-	-	-	100	2	1	-	3	
6.	100007	MC-4	Disaster Management	70	20	10	-	-	-	-	100	3	-	-	3	
7.	150606	DLC-5	Minor Project-II	-	-	-	50	50	-	-	100	-	-	4	2	
Total				350	100	50	80	70	25	75	750	19	2	6	24	

Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester

Additional Honours or Specialization	Course for minor	Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization
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* This courses must be run through SWAYAM/NPTEL/ MOOC

DE-1 (Through Traditional Mode)			OC-1		
S. No.	Subject Code	Subject Name	S. No.	Subject Code	Subject Name
1.	150611	Network & Web Security	1.	900106	Data Structures
2.	150613	Mobile Computing	2.	900107	Python Programming
3.	150614	Cloud Computing			

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform


DEAN (ACADEMICS)
M.I.T.S
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Scheme of Examination

B.Tech. VI Semester (Information Technology)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)												
S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Total Marks	Contact Hours per week			Total Credits
				End Sem.	Theory Slot	Quiz/Assign ment	Practical Slot		L	T	P	
1.	160601	DC	Compiler Design (DC-12)	70	20	10	30	20	2	1	2	4
2.	160602	DC	Computer Networks (DC-13)	70	20	10	-	-	4	-	-	4
3.	160603	DE	Departmental Elective (DE-1)	70	20	10	-	-	4	-	-	4
4.	160604	DE	Departmental Elective* (DE-2)	-	-	-	-	-	4	-	-	4
5.	160605	OC	Open Category (OC-1)	70	20	10	-	-	4	-	-	4
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	2	1	-	3
7.	160606	DLC	Minor Project-II (DLC-5)	-	-	-	50	50	3	-	-	3
Total				350	100	50	80	70	19	2	6	24
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester												
Additional Honours or Specialization		Course for minor		Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization								

* This courses must be run through SWAYAM/NPTEL/ MOOC

DE-1 (Through Traditional Mode)			OC-1		
S. No.	Subject Code	Subject Name	S. No.	Subject Code	Subject Name
1.	160611	Network & Web Security	1.	900108	Software Engineering
2.	160613	Agile Methodology	2.	900116	Data Mining & Warehousing
3.	160614	Cloud Computing			

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

DE-2. (Through Swayam)
1 Data Analytics with python 160651
2. Introduction to Machine Learning 160652
3. A.I : Knowledge Representation 160654 and Reasoning 160654

DEAN (ACADEMICS)
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***Syllabi of
Departmental Elective (DE-1) Courses
B.Tech VI Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -4]***

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NETWORK & WEB SECURITY
150611/ 160611 (DE-1)

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Stream Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction), IDS (Intrusion detection system): Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. **Firewalls:** Types, Functionality and Policies.

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Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared And Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms.
- CO2. illustrate fundamentals of number theory, attacks and security principles.
- CO3. apply number theory and various algorithms to achieve principles of security.
- CO4. analyze the cause for various existing network attacks and describe the working of available security controls.
- CO5. examine the vulnerabilities in IT infrastructure.
- CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.

MOBILE COMPUTING
150613 (DE-1)

COURSE OBJECTIVES

- To introduce the basic concepts and principles in mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, mobile devices, and network protocols.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

Unit-I

Review of Personal Communication Services (PCS): Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques.

Unit-II

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 Standard. Mobile IP.

Unit-III

Wireless Application Protocol (WAP): Mobile Internet Standard. WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit-IV

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

Unit-V

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies. Global Mobile Satellite Systems: Case Studies of IRIDIUM and GLOBALSTAR Systems. Bluetooth Technology, Wi-Fi and Wi-Max.

RECOMMENDED BOOKS

- Mobile communications, J. Schiller, Pearson Education.
- Wireless and Mobile Networks Architecture, by Yi —Bing Lin, John Wiley & Sons.

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- Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.
 - Wireless Communication- Principles and Practices, Theodore S. Rappaport, Pearson Education.
 - The Wireless Application Protocol, Singhal & Bridgman, Pearson Education.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the basic concepts of mobile telecommunications system.
 - CO2. demonstrate the infrastructure to develop mobile communications system.
 - CO3. classify the different generations and technology for mobile communications.
 - CO4. examine the working of different protocols of wireless mobile communication technology.
 - CO5. determine the importance of each technology suitable for different situation of mobile and wireless communications.
 - CO6. develop protocols for adhoc and infrastructure based wireless networks.
-

AGILE METHODOLOGY
160613 (DE-1)

COURSE OBJECTIVES

- To understand the background and driving forces for taking an agile approach to software development.
- To understand the business value of adopting agile approaches.
- To understand the agile development practices.

Unit -I

Fundamentals of Agile: The Genesis of Agile, Introduction and Background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven Development, Lean Software, Development, Agile Project Management, Design and Development Practices in Agile Projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit- II

Agile Scrum Framework: Introduction to Scrum, Project Phases, Agile Estimation, Planning Game, Product Backlog, Sprint Backlog, Iteration Planning, User Story Definition, Characteristics and Content of User Stories, Acceptance Tests and Verifying Stories, Project Velocity, Burn Down Chart, Sprint Planning and Retrospective, Daily Scrum, Scrum Roles – Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

Unit- III

Agile Testing: Agile Lifecycle and its Impact on Testing, Test-Driven Development (TDD), Xunit Framework and Tools for TDD, Testing User Stories - Acceptance Tests and Scenarios, Planning and Managing Testing Cycle, Exploratory Testing, Risk Based Testing, Regression Tests, Test Automation, Tools to Support Agile Tester.

Unit- IV

Agile Software Design and Development: Agile Design Practices, Role of Design Principles Including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle

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in Agile Design, Need and Significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated Build Tools, Version Control.

Unit -V

Industry Trends: Market scenario and Adoption of Agile, Agile ALM, Roles in Agile Project, Agile applicability, Agile in Distributed Teams, Business Benefits, Challenges in Agile, Risks and Mitigation, Agile Projects on Cloud, Balancing Agility with Discipline, Agile Rapid Development Technologies.

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schwaber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate scrum release planning, and scrum sprint planning.
 - CO2. apply user stories into tasks and ideal day estimates.
 - CO3. classify a sprint with sprint reviews and sprint retrospectives.
 - CO4. examine the scrum with multiple team or distributed project teams.
 - CO5. design test driven and agile principal based software.
 - CO6. develop any application using agile methodology.
-

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CLOUD COMPUTING

150614/ 160614(DE-1)

COURSE OBJECTIVES

- To introduce the broad perceptive of cloud architecture and model.
- To understand the concept of Virtualization.
- To apply different cloud programming model as per need.

Unit- I

Cloud Architecture and Model: Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

Unit- II

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

Unit- III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

Unit -IV

Programming Model: Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Mapping Applications, Programming Support, Google App Engine, Amazon AWS, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

Unit -V

Security in the Cloud: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

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RECOMMENDED BOOKS

- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- John W. Rittinghouse and James F. Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
- Kumar Saurabh, "Cloud Computing — insights into New-Era Infrastructure", Wiley India, 2011
- George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
- James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define various basic concepts related to cloud computing..
- CO2. identify the architecture, infrastructure and delivery models of cloud computing.
- CO3. apply suitable virtualization concept
- CO4. choose the appropriate programming models and approach
- CO5. analyse various security issues in cloud computing.
- CO6. compose virtualization, security and programming module in cloud computing solutions.

Annexure-II

***Syllabi of
Open Category (OC) Courses
B.Tech VI Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -6]***

DATA STRUCTURES
900106 (OC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their Characteristics, Asymptotic Notations, Arrays and its Representations, Index to Address Translation, **Linked List:** Introduction, Implementation of Linked List, Operations, Circular Linked List, Doubly Linked List, Polynomial Manipulation using Linked List.

Unit-II

Stacks: Concepts and Implementation of Stacks, Operations on Stack, Conversion of Infix to Postfix Notation, Evaluation of Postfix Expression, Recursion.

Queues: Concepts and Implementation, Operations on Queues, Dequeue, Priority Queues, Circular Queues and Application.

Unit-III

Trees: Types, Terminology, Binary Tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary Search Tree, Threaded Binary Tree and Height Balanced Tree.

Unit-IV

Graphs: Background, Graph Theory Terminologies, Representation of Graphs- Sequential & Linked Representation, Path Matrix, Graph Traversals- BFS, DFS, Spanning Trees, Applications of Graph.

Unit-V

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison between Sorting Techniques, Hashing and Collision Resolution Techniques.

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RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
 - An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
 - Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. outline the basics of algorithms and their performance criteria.
 - CO2. explain the working of linear/non-linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various data structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

PYTHON PROGRAMMING
900107 (OC-1)

COURSE OBJECTIVES

- To understand the structure and components of a python program.
- To learn the basic construct of python programming for implementing interdisciplinary research-based problems.
- To plot data using appropriate python visualization libraries for analysis.

Unit I

Introduction to Python: Setting Up Programming Environment, Running Python Programs from a Terminal, **Variables and Simple Data Types:** Variables, Strings, Numbers and Maths, Comments, Conditional Statements, Introducing Loops, Working of Input Function.

Unit II

Tuples and Lists: Tuples, Lists, List Operations, Using If Statements with Lists, Organizing a List, Working with Lists: Looping through Entire List, Making Numeric Lists, Working with Part of List. **Dictionaries and Sets:** Simple Dictionary, Looping Through a Dictionary, Nesting, Example with a Dictionary, Fibonacci and Dictionaries, Global Variables, Defining a Set, Set Operations.

Unit III

Functions: Defining a Function, Passing Arguments, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in Module, In- Built Functions, Lambda Functions. **Classes and Inheritance:** Object Oriented Programming, Creating and using a Class, Working with Class Instances, Methods, Inheritance, Importing Classes, Python Standard Library.

Unit IV

Files and Exceptions: Reading from a File, Writing to a File, File Operations, Assertions, Exceptions, Exception example. **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

Unit V

Data Visualization: Installing Matplotlib, Plotting a Simple Line Graph, Random Walks, Making Histogram. **Graphical User Interfaces:** Event-Driven Programming

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Paradigm; Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs;
Widget Attributes - Sizes, Fonts, Colors, Layouts, Nested Frames.

RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes.
- Learn Python the Hard Way: 3rd Edition.
- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the numbers, math, functions, strings, list, tuples and dictionaries in python.
 - CO2. apply different decision-making statements and functions.
 - CO3. identify the object-oriented programming in python.
 - CO4. analyze the different file handling operations.
 - CO5. design GUI applications in python and evaluate different database operations.
 - CO6. develop client-server network applications using python.
-

SOFTWARE ENGINEERING
900108 (OC-1)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, scrum and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, Software Model: Software Development of Life Cycle Model (SDLC), Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection Criteria of Model: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity, Types of Requirement- Functional and Non-Functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed Design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code

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(LOC) Based Estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
 - Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
 - Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
 - Software Engineering, Rajib Mall, PHI.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1.** explain the various fundamental concepts of software engineering.
 - CO2.** develop the concepts related to software design & analysis.
 - CO3.** compare the techniques for software project management & cost estimation.
 - CO4.** choose the appropriate model for real life software project.
 - CO5.** design the software using modern tools and technologies.
 - CO6.** test the software through different approaches.
-

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Department of Computer Science & Engineering and Information Technology

DATA MINING & WAREHOUSING (OC-I)

COURSE OBJECTIVES

- To understand the significance of data mining in real-world perspective.
- To gain understanding of data mining techniques, algorithms and commonly used tools.
- To develop ability for applying data mining techniques and tools for solving real-world problems.

Unit - I

Introduction: Motivation, important, Data type for Data Mining: Relational Databases, Data Ware-Houses, Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation, Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

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Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
 - Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain various data mining tasks.
 - CO2. classify various databases systems and data models / schemas of data warehouse.
 - CO3. compare various methods for storing & retrieving data from different data sources/repository.
 - CO4. apply pre-processing techniques for construction of data warehouse.
 - CO5. analyze data for knowledge discovery & prediction using appropriate algorithms.
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Annexure-III

***Syllabi of
Departmental Core (DC) Courses
B.Tech VI Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -7]***

COMPILER DESIGN
150601/160601 (DC-12)

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
 - To learn, various phases of compiler
 - To understand process of compiler implementation.
-

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation, Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Routines or Printing Various Lexical, Syntax and Semantic Errors.

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Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator: Generators, Specification of Machine. **Code Optimization:** Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Loudon, Cengage Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define the concepts of finite automata and context free grammar.
 - CO2. build the concept of working of compiler.
 - CO3. examine various parsing techniques and their comparison.
 - CO4. compare various code generation and code optimization techniques.
 - CO5. analyze different tools and techniques for designing a compiler.
 - CO6. design various phases of compiler.
-

COMPUTER NETWORKS
150602/160602 (DC-13)

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd-Warshall's Algorithm, Flooding, Congestion

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Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session & Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer -, Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the fundamental concepts of computer network.
 - CO2. illustrate the basic taxonomy & terminologies of computer network protocols.
 - CO3. develop a concept for understanding advance computer network.
 - CO4. build the skill of IP addressing and routing mechanism.
 - CO5. predict the performance of computer network in congestion and internet.
 - CO6. construct the network environment for implementation of computer networking concept.
-

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B.Tech. IV Semester (Computer Science & Engineering)
Scheme of Examination

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)														
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot				L	T	P	
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work & Sessional						
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4	
2.	150401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4	
3.	150402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4	
4.	150403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4	
5.	150404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4	
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3	
7.	150405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	6	3	
Total				420	120	60	90	60	750	14	7	10	26	
NSS/NCC				Qualifier										
Summer Internship Project-II (Softskills Based) for two weeks duration: Evaluation in V Semester														

*Virtual Lab to be conducted along with the traditional lab

Scheme of Examination
B.Tech. IV Semester (Information Technology)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)														
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits	
				Theory Slot			Practical Slot			L	T	P		
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work Lab Work & Sessional						
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4	
2.	160401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4	
3.	160402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4	
4.	160403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4	
5.	160404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4	
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3	
7.	160405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	6	3	
Total				420	120	60	90	60	750	14	7	10	26	
NSS/NCC				Qualifier										
Summer Internship Project-II (Soft skills Based) for two weeks-duration: Evaluation in V Semester														

*Virtual Lab to be conducted along with the traditional lab

***Syllabi of
Departmental Core (DC) Courses
B.Tech IV Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -8]***

DESIGN & ANALYSIS OF ALGORITHMS
150401/160401 (DC-5)

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: RAM, Turing machine, Circuit model, PRAM, Bulk synchronous parallel (BSP) Model, Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** Binary Search Trees, Height Balanced Trees, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees:** Prim's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

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Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
 - Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
 - Design & Analysis of Computer Algorithms, Ullmann, Pearson.
 - Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the basic features of an algorithm.
 - CO2. demonstrate a familiarity with major algorithms and data structures.
 - CO3. apply important algorithmic design paradigms and methods of analysis.
 - CO4. analyze the asymptotic performance of algorithms.
 - CO5. compare different design techniques to develop algorithms for computational problems.
 - CO6. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.
-

DATABASE MANAGEMENT SYSTEM
150402/160402 (DC-6)

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Concepts & Architecture, Introduction of File organization Techniques, Database Approach v/s Traditional File Approach, Advantages of Database System, Schemas, Instances, Data Independence, Functions of DBA, Entities & Attributes, Entity types, Value Sets, Key Attributes, Relationships, E-R Diagram.

Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Unit-II

Relational Data Models: Domains, Tuples, Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.

Query Languages: Relational Algebra & Relational Calculus, Relational Algebra operations like Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Data Definition, Data Manipulation in SQL, Update Statements & Views in SQL Query & Subquery, Query by Example Data Storage Definition, Data Retrieval Queries, Set Operations, Aggregate functions, Nested sub queries, Data Manipulation Statements etc. Overview of Tuple Oriented & Domain Oriented Relational Calculus & Operations.

Unit-IV

Database Design: Introduction to Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Attribute closure, Decomposition, Dependency

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Preservation, Loss Less & Lossy Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Processing Concepts: Introduction, State Diagram, Properties of Transaction, Types of Transaction, Serializability: Conflict and View Serializability, Concurrency Control: Concepts, Techniques, Concurrent operation of Databases, Recovery: Introduction, Types of Recovery.

Overview of Distributed Databases: Protection, Security & Integrity Constraints. Relational Database Management Systems: Oracle & Microsoft Access Tools. Basic Concepts of Object Oriented Database System & Design.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

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

- CO1. tell the terminology, features, classifications, and characteristics embodied in database systems.
- CO2. explain different issues involved in the design and implementation of database system.
- CO3. apply transaction processing concepts and recovery methods over real time data.
- CO4. analyze database schema for a given problem domain.
- CO5. justify principles for logical design of databases, including the e-r method and normalization approach.
- CO6. formulate, using relational algebra and sql, solutions to a broad range of query problems.

OPERATING SYSTEM
150403/160403 (DC-7)

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
 - To compare several different approaches to memory management, file management and process management.
 - To understand various problems related to concurrent operations and their solutions.
-

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling. **File System Interface:** The Concept of a File, Access

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Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

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

- CO1. tell the basic concept of operating systems.
 - CO2. explain the working of operating system.
 - CO3. develop the solution of various operating system problems/issues.
 - CO4. analyze the various operating system problems/issues.
 - CO5. measure the performance of various scheduling/allocation approaches.
 - CO6. test the working of various scheduling/allocation approaches.
-

COMPUTER SYSTEM ORGANIZATION
150404/160404 (DC-8)

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
 - To provide the details of input & output operations, memory management and performance measurement of the computer system.
 - To understand how computer represents and manipulate data.
-

Unit -I

Introduction: Von Newman Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC). Hardwired and Microprogrammed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA

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Transfer), Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J.P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. recall the basic building blocks of computer Architecture.
- CO2. compare different memories.
- CO3. apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems.
- CO4. analyze various modes of Input-Output data transfer.
- CO5. evaluate the arithmetic related to the number system.
- CO6. develop the skill of writing low level programming.

Annexure-V

***Scheme & Syllabi
of
B. Tech I & II Semester
(Computer Science & Engineering)
Under Flexible Curriculum
[ITEM CSEIT -9]***

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Scheme of Examination

GROUP Y: I Semester

B. Tech. I Semester (Computer Science & Engineering)

For batches admitted in academic session 2020-21 onwards

For batches admitted in academic session 2020–21 onwards														
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per Week			Total Credits
				Theory Slot			Practical Slot				L	T	P	
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.	Lab work / Sessional						
1.	230102	DC	Introduction to Computer Programming	60	20	20	60	40	200	2	1	2	4	
2.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	40	200	2	1	2	4	
3.	100020	ESC	Basic Civil Engineering & Mechanics	60	20	20			100	2	1	-	3	
4.	100021	ESC	Basic Mechanical Engineering	60	20	20	-	-	100	2	1	-	3	
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	100	3	-	-	3	
6.	150111	DLC	IT workshop	-	-	-	60	40	100	-	-	4	2	
			Total	300	100	100	180	120	800	11	04	08	19	
Induction Programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.														
NSS / NCC										Qualifier				

GROUP X: (Civil, Mechanical, Electrical, Chemical, and Automobile)

GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

01 Theory Period=1 Credit; 02 Practical Periods=1 Credit


DEAN (ACADEMICS)
M.I.T.S
GWALIOR

Scheme of Examination
GROUP Y: II Semester
B. Tech. II Semester (Computer Science & Engineering)

For batches admitted in academic session 2020-21 onwards

For dates mentioned in academic session 2020 – 21 onwards													
S. No.	Subject Code .	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credits
				Theory Slot		Practical Slot		Lab work / Sessional		L	T	P	
				End Sem.	Mid Sem.	Quiz/Assign ment	End Sem.						
1.	100011	BSC	Engineering Mathematics –I	60	20	20	-	-	100	3	1	-	4
2.	150211	DC	Data Structures	60	20	20	60	40	200	2	1	2	4
3.	150212	DC	Object Oriented Programming & Methodology	60	20	20	60	40	200	3	-	2	4
4.	150213	DC	Digital Electronics	60	20	20	-	-	100	2	1		3
5.	100016	HSMC	Technical Language	60	20	20	-	-	100	3	-	-	3
6.	100017	HSMC	Language Lab	-	-	-	60	40	100	-	-	2	1
			Total	300	100	100	180	120	800	13	03	06	19
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.													
NSS / NCC							Qualifier						

GROUP X: (Civil, Mechanical, Electrical, and Automobile)

GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication, Chemical)

01 Theory Period=1 Credit; 02 Practical Periods =1 Credit


DEAN (ACADEMICS)
M.I.T.S
GWALIOR

INTRODUCTION TO COMPUTER PROGRAMMING
230102

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
- To familiar with debugging process.
- To design and implement basic programming solutions including statements, control structures, and methods.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
- Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
- Yashavant Kanetkar, Let Us C, BPB publication.
- E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DATA STRUCTURES
150211 (DC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

Unit-V

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
150212 (DC-2)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the concepts of classes & objects and their significance in real world.
 - CO2. explain the benefits of object oriented design.
 - CO3. build C++ classes using appropriate encapsulation and design principles.
 - CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO5. choose appropriate object orient programming concepts for solving real world problems.
 - CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-

DIGITAL ELECTRONICS
150213 (DC-3)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

***Scheme & Syllabi
of
B. Tech I & II Semester
(Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -9]***

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Scheme of Examination

GROUP Y: I Semester

B. Tech. I Semester (Information Technology)

For batches admitted in academic session 2020 - 21 onwards

For students admitted in Academic Session 2020-2021													
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credits
				Theory Slot		End Sem.	Quiz/Assignment	End Sem.		Practical Slot		L	
				End Sem.	Mid Sem.				Lab work / Sessional				
1.	230102	DC	Introduction to Computer Programming	60	20	20	60	40	200	2	1	2	4
2.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	40	200	2	1	2	4
3.	100020	ESC	Basic Civil Engineering & Mechanics	60	20	20			100	2	1	-	3
4.	100021	ESC	Basic Mechanical Engineering	60	20	20	-	-	100	2	1	-	3
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	100	3	-	-	3
6.	160111	DLC	IT workshop	-	-	-	60	40	100	-	-	4	2
			Total	300	100	100	180	120	800	11	04	08	19
Induction Programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.													
NSS / NCC													
Qualifier													

GROUP X: (Civil, Mechanical, Electrical, Chemical, and Automobile)

GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

01 Theory Period = 1 Credit; 02 Practical Periods = 1 Credit

MKS
DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Scheme of Examination
GROUP Y: II Semester
B. Tech. II Semester (Information Technology)

For batches admitted in academic session 2020-21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Contact Hours per Week			Total Credits	
				Theory Slot			Practical Slot			Total Marks	L	T		P
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.	Lab work / Sessional						
1.	100011	BSC	Engineering Mathematics –I	60	20	20	-	-	100	3	1	-	4	
2.	160211	DC	Data Structures	60	20	20	60	40	200	2	1	2	4	
3.	160212	DC	Object Oriented Programming & Methodology	60	20	20	60	40	200	3	-	2	4	
4.	160213	DC	Digital Electronics	60	20	20	-	-	100	2	1	-	3	
5.	100016	HSMC	Technical Language	60	20	20	-	-	100	3	-	-	3	
6.	100017	HSMC	Language Lab	-	-	-	60	40	100	-	-	2	1	
			Total	300	100	100	180	120	800	13	03	06	19	
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.														
NSS / NCC													Qualifier	

GROUP X: (Civil, Mechanical, Electrical, and Automobile)
GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication, Chemical)
01 Theory Period=1 Credit; 02 Practical Periods =1 Credit


DEAN (ACADEMICS)
M.I.T.S
GWALIOR

INTRODUCTION TO COMPUTER PROGRAMMING
230102

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
 - To familiar with debugging process.
 - To design and implement basic programming solutions including statements, control structures, and methods.
-

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DATA STRUCTURES
160211 (DC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
160212 (DC-2)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the concepts of classes & objects and their significance in real world.
 - CO2. explain the benefits of object oriented design.
 - CO3. build C++ classes using appropriate encapsulation and design principles.
 - CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO5. choose appropriate object orient programming concepts for solving real world problems.
 - CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-

DIGITAL ELECTRONICS
160213 (DC-3)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

Annexure-VII

***Scheme & Syllabi
(I & II Semester)
of
NEW B. Tech. Programme
(Internet of Things (IoT))
Under Flexible Curriculum***

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. in Internet of Things (IoT) (Offered by Department of Information Technology)

I Semester

For batches admitted in Academic Session 2020-21 Onwards

For Dates mentioned in Academic Session 2023-24													
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot		Quiz/ Assignment	Practical Slot			L	T	P	
				End Sem.	Mid Sem Exam.		End Sem.	Lab work & Sessional					
1.	230101	DC	Introduction to Internet of Things (IoT)	60	20	20	-	-	100	4	-	-	4
2.	230102	DC	Introduction to Computer Programming	60	20	20	60	40	200	2	1	2	4
3.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	40	200	2	1	2	4
4.	250100	BSC	Linear Algebra	60	20	20	-	-	100	3	1	-	4
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	100	3	-	-	3
Total				300	100	100	120	80	700	14	03	04	19
NSS/NCC													
Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations													

MF

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. in Internet of Things (IoT) (Offered by Department of Information Technology)

II Semester

For batches admitted in Academic Session 2020-21 Onwards													
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional					
1.	230201	DC	Digital Logic Design	60	20	20	-	-	100	2	1	-	3
2.	220202	DC	Sensor Technology	60	20	20	60	40	200	3	-	2	4
3.	230202	DC	Data Structures	60	20	20	60	40	200	3	-	2	4
4.	230203	DC	Object Oriented Programming and Methodology	60	20	20	60	40	200	3	-	2	4
5.	100016	HSMC	Technical Language	60	20	20	-	-	100	3	-	-	3
6.	100017	HSMC	Language Lab	-	-	-	60	40	100	-	-	2	1
Total				300	100	100	240	160	900	14	1	8	19
NSS/NCC				Qualifier									
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration (Evaluation in III Semester)													

MD
DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MD

INTRODUCTION TO INTERNET OF THINGS (IoT)
230101 (DC)

COURSE OBJECTIVES

- To understand basic terminology of Internet of Things.
 - To understand technology behind interaction between things.
 - To understand basic terminology of Internet of Things.
-

Unit I

Internet of things (IoT) : Introduction, Evaluation of IoT concept, Definition, Key features and components, IoT Building block, IoT Characteristics, Advantages and Disadvantages.

Unit II

IoT Applications, IoT application structures and driver technologies : collection, transmission, processing, managing, utilization phase, Telematics and Telemetry, Telematics vs IoT, Machine-to-Machine communication, M2M vs IoT, IoE, IIoT, V2V, V2X.

Unit III

IoT hardware and software, Study of IoT Sensors, Actuators, Wearable electronics, Standard devices, Concept of Cloud, Edge, Fog and Roof computing in IoT, Introduction to communication, Components of communication system, Modes of communication, Types of data transmission, IoT communication models : Device-to-Device, Device-to-Cloud, Device-to-Gateway, and Back-End Data-Sharing, IoT Connectivity and Management.

Unit IV

Introduction to Internet and Networking Protocol, IoT protocols, Types of IoT Networks, Introduction of WSN, RF wireless sensors, RFID, WiFi, Bluetooth, IP Based Cellular Networks & 3G, 4G.

Unit V

IoT Challenges: Interoperability, Precision, Data volume and scalability, Internet connectivity, **IoT Security:** Security vulnerabilities in overall IoT system, Security vulnerabilities at different layers of IoT architecture, IoT Privacy and Trust, Standardization gap.

RECOMMENDED BOOKS

- Internet of Things from Hype to Reality, The Road to Digitization, Ammar Rayes and Samer Salam, Second Edition, Springer
- Internet of Things (IoT) Technology, Economic View And Technical Standardization, Etienne Schneider, Version 1.0, ILNAS
- Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, Dimitrios Serpanos and Marilyn Wolf, Springer
- Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, McGraw Hill Education

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: explain basic terminology of Internet of Things.
- CO2: illustrate the role of communication in IoT.
- CO3: identify and use various protocols devices that are used in IoT.
- CO4: classify networking, cloud and fog computing concept for data management.
- CO5: investigate challenges, security and privacy.
- CO6: discuss different IoT enabled techniques behind interaction between things.
-

INTRODUCTION TO COMPUTER PROGRAMMING
230102 (DC)

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
- To familiar with debugging process.
- To design and implement basic programming solutions including statements, control structures, and methods.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DIGITAL LOGIC DESIGN
230201 (DC)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop, Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

DATA STRUCTURES
230202 (DC)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

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Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
230203 (DC)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the concepts of classes & objects and their significance in real world.
 - CO2. explain the benefits of object oriented design.
 - CO3. build C++ classes using appropriate encapsulation and design principles.
 - CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO5. choose appropriate object orient programming concepts for solving real world problems.
 - CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
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Annexure-VII

***Scheme & Syllabi
(I & II Semester)
of
NEW B. Tech. Programme
Information Technology (Artificial
Intelligence and Robotics)
Under Flexible Curriculum***

Scheme of Examination

B.Tech. in Information Technology (Artificial Intelligence and Robotics)

(Offered by Department of Information Technology)

I Semester

For batches admitted in Academic Session 2020-21 Onwards

For batches admitted in Academic Session 2020-21 Onwards												
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Total Marks	Contact Hours per week			Total Credits
				Theory Slot		Practical Slot			L	T	P	
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.					
1.	240101	DC	Introduction to Artificial Intelligence	60	20	20	-	100	4	-	-	4
2.	230102	DC	Introduction to Computer Programming	60	20	20	60	200	2	1	2	4
3.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	200	2	1	2	4
4.	250100	BSC	Linear Algebra	60	20	20	-	100	3	1	-	4
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	100	3	-	-	3
Total				300	100	100	120	700	14	3	04	19
NSS/NCC				Qualifier								
Induction program of first three weeks (MC):Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations												


 DEAN (ACADEMICS)
 M.I.T.S
 GWALIOR

Scheme of Examination
B.Tech. in Information Technology (Artificial Intelligence and Robotics)
(Offered by Department of Information Technology)

II Semester

For batches admitted in Academic Session 2020-21 Onwards													
S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Total Marks	Contact Hours per week			Total Credits	
				Theory Slot		Quiz/ Assignment	Practical Slot		L	T	P		
				End Sem.	Mid Sem.		End Sem.						Lab work & Sessional
1.	230201	DC	Digital Logic Design	60	20	20	-	100	2	1	-	3	
2.	220202	DC	Sensor Technology	60	20	20	40	200	3	-	2	4	
3.	230202	DC	Data Structures	60	20	20	40	200	3	-	2	4	
4.	230203	DC	Object Oriented Programming and Methodology	60	20	20	40	200	3	-	2	4	
5.	100016	HSMC	Technical Language	60	20	20	-	100	3	-	-	3	
6.	100017	HSMC	Language Lab	-	-	-	40	100	-	-	2	1	
Total				300	100	100	240	900	14	1	8	19	
NSS/NCC				Qualifier									
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration (Evaluation in III Semester)													


 DEAN (ACADEMICS)
 M.I.T.S
 GWALIOR

INTRODUCTION TO ARTIFICIAL INTELLIGENCE
240101 (DC)

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basic representation and reasoning paradigms used in AI.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming, Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time, etc, Data Types: Categorical/Nominal/Ordinal, Etc..., Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Introduction to Optimization: Evolutionary Algorithms, Genetic Algorithms: Basic Concepts, Optimization, Need for Optimization, Membership Functions.

Unit IV

Introduction to Intelligent Agent, Characteristics and functionalities, Introduction to Expert System, Roles of Expert Systems, Logic and Reasoning in AI: Introduction to Logic, Basic

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of Boolean Algebra, Logic Gates, Propositional and Predicate Logic: Interpretation of Formulas, Syntax and Semantics of an Expression, Inference Rules.

Unit V

Artificial Intelligence in Real World: Speech Processing, Natural Language Processing, Planning, Engineering and Expert Systems, Fuzzy Systems, Models of Brain and Evolution, AI in Healthcare, Defence and Agriculture, Cyber Security, Agriculture, E-Commerce, Gaming, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: define basic concepts of Artificial Intelligence.
 - CO2: relate various computer components used in Artificial Intelligence.
 - CO3: identify different logical and reasoning techniques used in AI.
 - CO4: analyze the general approach of optimization, intelligent agent and expert system.
 - CO5: analyze the general approach of machine learning.
 - CO6: build AI enabled intelligent procedures for solving real world problems.
-

INTRODUCTION TO COMPUTER PROGRAMMING
230102 (DC)

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
- To familiar with debugging process.
- To design and implement basic programming solutions including statements, control structures, and methods.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DIGITAL LOGIC DESIGN
230201 (DC)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
- CO2. recall different number system and solve the basic arithmetic operations.
- CO3. develop the understanding of combinational circuits.
- CO4. analyze the basic concept of sequential circuits.
- CO5. compare various memories.
- CO6. solve the boolean functions using logic gates.

DATA STRUCTURES
230202 (DC)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

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Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
230203 (DC)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO7. tell the concepts of classes & objects and their significance in real world.
 - CO8. explain the benefits of object oriented design.
 - CO9. build C++ classes using appropriate encapsulation and design principles.
 - CO10. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO11. choose appropriate object orient programming concepts for solving real world problems.
 - CO12. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-