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 Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem	Lab Work & Sessional	Assignment	Exam		L	T	P	
1.	DE	DE	Departmental Elective (DE-3)	70	20	10	-	-	-	-	100	3	-	-	3
2.	DE	DE	Departmental Elective (DE-4)						25	75	100	3		-	3
3.	OC	OC	Open Category (OC-2)	70	20	10	-	-	-	-	100	3	1	-	3
4.	OC	OC	Open Category (OC-3)	70	20	10	-	-	-	-	100	3	-	-	3
5.	100008	MC	Intellectual Property Rights (IPR) (MC)	70	20	10	-	-	-	-	100	2	-	-	-
6.	150701	DLC	Departmental Lab (DLC-6)	-	-	-	50	50	-	-	100	-	-	4	2
7.	150702	DLC	Summer Internship Project-III (04 weeks)-(Evaluation) (DLC-7)	-	-	-	50	50	-	-	100	-	-	4	2
8.	150703	DLC	Creative Problem Solving (Evaluation) (DLC-8)	-	-	-	25	25	-	-	50	-	-	2	1
Total				280	80	40	125	125	25	75	750	11	1	10	17
Additional Courses for obtaining Honours or minor Specialization in electronic stream				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization											

DE-3 (Through Traditional Mode)

S. No.	Subject Code	Subject Name
1	150711	Natural Computing with DNA/ DP
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	900208	Soft Computing
2	900209	Network Security
3	900210	Data Mining & Warehousing

OC-3

S. No.	Subject Code	Subject Name
1	900251	R Programming
2	900252	Artificial Intelligence
3	900253	Computer Networks

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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. 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		MOOCs						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Assignment	Exam		L	T	P	
1.	DE	DE	Departmental Elective (DE-3)	50	20	10	-	-	-	-	100	3			3
2.	DE	DE	Departmental Elective (DE-4)	-	-	-	-	-	25	75	100	3			3
3.	OE	OE	Open Category (OC-2)	50	20	10	-	-	-	-	100	3	1	-	4
4.	OE	OE	Open Category (OC-3)	50	20	10	-	-	-	-	100	3	-	-	3
5.	100008	MC	Intellectual Property Rights (IPR) (MC)	50	20	10	-	-			100	2			2
6.	168703	DLC	Departmental Lab (DLC-6)	-	-	-	50	50	-	-	100	-	-	4	2
7.	160782	DLC	Summer Internship Project-III (04 weeks) (Evaluation) (DLC-7)	-	-	-	50	50		-	100	-	-	4	2
8.	168704	DLC	Creative Problem Solving (Evaluation) (DLC-8)	-	-	-	25	25	-	-	50	-	-	2	1
Total				200	80	40	125	125	25	75	750	11	1	18	17
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											

DE -3 (Through Traditional Mode)

S. No.	Subject Code	Subject Name
1	160711	Networking with TCP/IP
2	160712	Data Mining & Warehousing
3	160713	Software Testing

DE -4*

S. No.	Subject Code	Subject Name
1	160731	Practical Machine Learning with Tensorflow
2	160732	Scalable Data Science
3	160733	Introduction to Internet of Things

OC-2

S. No.	Subject Code	Subject Name
1	000208	Soft Computing
2	000209	Network Security
3	000210	Data Mining & Warehousing

OC-3

S. No.	Subject Code	Subject Name
1	000220	R Programming
2	000221	Artificial Intelligence
3	000222	Computer Networks

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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

ANNEXURE – I

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

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

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

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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

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

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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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

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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.

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

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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

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 Catching 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.

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

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

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

ANNEXURE – II

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

[ITEM-4]

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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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 ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network. **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield 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:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-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

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

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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.

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 Steam 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 Polices

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

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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

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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.

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

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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

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

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RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1 define basic programming constructs used in R

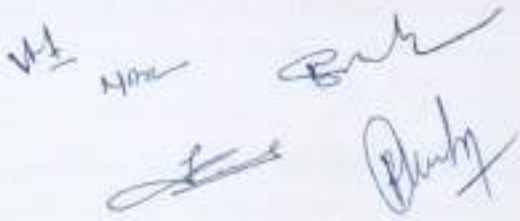
CO2 explain the various commands used in R

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

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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.

Unit-V

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

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RECOMMENDED BOOKS

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

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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.

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.

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

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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.

ANNEXURE – III

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

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 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		MOOCs						
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work/ sessional	Assignment	Exam		L	T	P	
1.	620111	Database 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-I	70	20	10	-	-	-	-	100	3	-	-	3
5.	OE	Open Category Course (OC-1)	70	20	10	-	-	-	-	100	3	-	-	3
6.	620121	Lab-I	-	-	-	100	50	-	-	150	-	-	4	4
7.	620122	Self-Learning Presentation	-	-	-	-	100	-	-	100	-	-	2	2
		Total	350	100	50	50	150			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 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 presentations)

DE-1	
Subject Code	Subject Name
620114	Mobile Computing & M-Commerce
620115	Adhoc & Sensor Based Networks
620116	Network Security
620117	Computer Architecture and Parallel Processing

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

DEAN (ACADEMICS)
MITS
GWALIOR

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 Technology (Computer Science & Engineering) [Scheme/Sem: 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	Algorithms 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	-	-	-	90	60	-	-	150	-	-	4	4
7.	620222	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/ mini*r projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.
Self learning / presentation through SWAYAM / NPTEL (Registeration 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

DEAN (ACADEMICS)
MITS
GWALIOR

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 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		MOOCs						
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assignment	Exam		L	T	P	
1.	620311	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.

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

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Master of Technology (Computer Science & Engineering) (Semester-IV) **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						
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation		L	T	P	
1.	620405	Dissertation Part-II	-	-	-	300	200	500	-	-	14	14
		Total	-	-		300	200	500	-		14	14

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

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 Technology (Information Technology) (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.	630111	Database Systems	70	20	10	-	-	-	-	100	3	-	-	3
2.	630112	Distributed Computing	70	20	10	-	-	-	-	100	3	-	-	3
3.	630113	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-1)	70	20	10	-	-	-	-	100	3	-	-	3
6.	630125	Lab-I	-	-	-	90	60	-	-	150	-	-	4	4
7.	630122	Self Learning/ Presentation	-	-	-	-	100			100	-	-	2	2
		Total	350	100	50	90	160	-	-	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 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-1	
Subject Code	Subject Name
630114	Mobile Computing & AI-Connected
630115	Adhoc & Sensor Based Networks
630116	Information Security & Systems
630117	Models and Techniques in Computer Graphics

OC-1	
Subject Code	Subject Name
800052	Soft Computing
800104	Blockchain Technology
800107	Machine Learning using Python

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

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 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			L	T	P	
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam					
1.	630211	Algorithms 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	-	-	150	-	-	4	4
7.	630222	Self Learning Presentation	-	-	-	-	100	-	-	100	-	-	2	2
		Total	280	80	40	50	150	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

DEAN (ACADEMICS)
MITS
GWALIOR

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 Technology (Information Technology) [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		MOOCs						
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assignment	Exam		L	T	P	
1.	670711	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 / DoS.

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

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 Technology (Information Technology) (Semester-IV) **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						
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation		L	T	P	
1.	630405	Dissertation Part-II	-	-	-	300	200	500	-	-	14	14
		Total	-	-	-	300	200	500	-	-	14	14

DEAN (ACADEMICS)
MITS
GWALIOR

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 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						
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work/ sessional	Assignment	Exam		L	T	P	
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-1)	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-1) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects.

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-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

DEAN (ACADEMICS)
MITS
GWALIOR

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 Technology (Cyber Security) (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						
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam		L	T	P	
1.	640211	Cyber Crime Investigations and Digital Forensics	70	20	10	-	-	-	-	100	3	-	-	3
2.	640212	Advanced Topics in Data Mining & Warehousing	70	20	10	-	-	-	-	100	3	-	-	3
3.	640213	Information Security & Systems	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.	640221	Lab-II*	-	-	-	90	60	-	-	150	-	-	4	4
7.	640222	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
640214	Internet of Things
640215	Deep Learning
640216	Cloud Computing
640217	Social Networking

DEAN (ACADEMICS)
MITS
GWALIOR

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 Technology (Cyber Security) (Semester-IV) **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						
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation		L	T	P	
1.	6-00405	Dissertation Part-II	-	-	-	300	200	500	-	-	14	14
		Total	-	-	-	300	200	500	-	-	14	14

DEAN (ACADEMICS)
MITS
GWALIOR

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

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

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

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Recommended Books:

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

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 ersus 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

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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

4 H. F. Korth and A. Silberschatz. Database Cocepts, TMH.
5 Godbole, "Information system security", Willey
6 Cole Krutz & Conley "Network security" Willey
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.

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

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

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.

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

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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, Uyless 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

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COURSE OUTCOMES

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

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-constained 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.

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, Coremen Thomas, Leiserson CE, Rivest RL, PHI
4. Design & Analysis of Computer Algorithms, Ullmann, Pearson.
5. Algorithm Design, Michael T Goodrich, Robarto 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

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 Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009
2. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics", Tata McGraw -Hill, New Delhi, 2006
3. Robert M Slade," Software Forensies", 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

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 Algorithm 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", harcout india private limited, 2001
2. Margaret h. Dunham, "data mining: introductory and Advanced topic" pearson education, 2003

COURSE OUTCOMES

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

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 & Weiner 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

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Recommended Books:

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

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 count-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 JavaScript. 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

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 TSL, Firewall, Digital Signatures and its standards & schemes, and the enhancements made to IPv4 by IPsec
CO6: discuss various web security considerations

Department of Computer Science & Engineering and Information Technology

MOBILE COMPUTING & M-COMMERCE
6.30114

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

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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

COURSE OUTCOMES

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

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

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 (DBR), 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

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Recommended Books:

1. Ad HOC Wireless Networks: Architectures & Protocols by C Siva Ram Murty & BS Manoj 2nd Ed. Pearson Education
2. Adleshem & Gupta, "Fundamentals of Mobile and Pervasive Computing", TMH, 2005
3. Handbook of Ad Hoc wireless network, By Mohamed Illayas, 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 Willey & Sons

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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 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

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, Hopefield 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

Genetic Algorithm Flow, Classification of Genetic Algorithm Comparison with Evolutionary algorithms, 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

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

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RECOMMENDED BOOKS

- Blockchain, Melanie Swa, O'Reilly
- Blockchain: From Concepts to Execution, DebaganiMohanty
- Zero to Blockchain, Bob Dill, David Smits

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

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

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-

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

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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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Scheme of Examination

B.Tech. 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						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Assignment	Exam		L	T	P	
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

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)
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

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Assignment	Exam		L	T	P	
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.	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)
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. VI Semester (Computer Science & Engineering)

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						
				End Sem.	Mid Sem Exam.	Quiz/ Assign ment	End Sem.	Lab work & Sessional	Assign ment	Exam		L	T	P	
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*	-	-	-	-	-	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 Course for Honours or minor Specialization			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)		
S. No.	Subject Code	Subject Name
1.	150611	Network & Web Security
2.	150613	Mobile Computing
3.	150614	Cloud Computing

OC-1		
S. No.	Subject Code	Subject Name
1.	900106	Data Structures
2.	900107	Python Programming

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

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. 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
				Theory Slot			Practical Slot		MOOCs						
				End Sem.	Mid Sem Exam.	Quiz/ Assign ment	End Sem.	Lab work & Sessional	Assign ment	Exam		L	T	P	
1.	160601	DC	Compiler Design (DC-12)	70	20	10	30	20	-	-	150	2	1	2	4
2.	160602	DC	Computer Networks (DC- 13)	70	20	10	-	-	-	-	100	4	-	-	4
3.	~~160603~~	DE	Departmental Elective (DE-1)	70	20	10	-	-	-	-	100	4	-	-	4
4.	~~160604~~	DE	Departmental Elective* (DE-2)	-	-	-	-	-	25	75	100	4	-	-	4
5.	~~160605~~	OC	Open Category (OC-1)	70	20	10	-	-	-	-	100	2	1	-	3
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	-	-	100	3	-	-	3
7.	~~160606~~ 160603	DLC	Minor Project-II (DLC-5)	-	-	-	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 Course for Honours or minor Specialization			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)		
S. No.	Subject Code	Subject Name
1.	160611	Network & Web Security
2.	160613	Agile Methodology
3.	160614	Cloud Computing

OC-1		
S. No.	Subject Code	Subject Name
1.	900108	Software Engineering
2.	900116	Data Mining & Warehousing

* 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. AI : Knowledge Representation and Reasoning 160654

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

Annexure-I

Syllabi of
Departmental Elective (DE-1) Courses
B.Tech VI Semester
(Computer Science & Engineering / Information Technology)
Under Flexible Curriculum

[ITEM CSEIT -4]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

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 Steam 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 Polices.

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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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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.

- 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.

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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

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 Schawber, 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.

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]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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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.

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.

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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

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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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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

(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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Computer Science & Engineering and Information Technology

DATA MINING & WAREHOUSING
(OC-1)

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.

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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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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.

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. Louden, 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.

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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

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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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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 :** Prims'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.

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, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto 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.

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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

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.

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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 form 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

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.

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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

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.

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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.

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.

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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.

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.

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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.

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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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.

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.

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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

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
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				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

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DEAN (ACADEMICS)
M.I.T.S
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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						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
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)													

DEAN (ACADEMICS)
M.I.T.S
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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

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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.

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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

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.

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COMPUTER GRAPHICS & MULTIMEDIA
160303 (DC-3)

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object design.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image Representation, Line Drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D Object on Screen, Parallel and Perspective Projections. **Clipping:** Point Clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc, Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Area Filling, Hidden **Surface Elimination:** Z- Buffer Algorithm and Painter's Algorithm.

Unit-IV

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models like RGB, YIQ, CMY, HSV etc.

Unit-V

Multimedia System: Introduction, Multimedia Hardware, Multimedia System Architecture. Data & File Format Standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG, **Audio:** Digital Audio, MIDI, Processing Sound, Sampling, Compression. **Video:** Avi, 3GP, MOV, MPEG, Compression Standards, Compression through Spatial and Temporal Redundancy. Multimedia Authoring.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker: Computer Graphics, PHI Publication.
- FoleyVandam, Feiner, Hughes: Computer Graphics Principle and Practice.
- Rogers:Principles of Computers Graphics, TMH.
- Sinha and Udai: Computer Graphics, TMH.
- Digital Image Processing by Gonzalez.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. explain interactive computer graphics, various display devices and explore applications of computer graphics.

CO2. illustrate various line generations, circle generation, curve generation, shape generation algorithms and storage technique.

CO3. apply various 2-dimensional, 3-dimensional transformations and projections on images.

CO4. classify methods of image clipping and various algorithms for line and polygon clipping and different multimedia storage extensions.

CO5. choose appropriate filling algorithms, hidden surface elimination algorithm and apply on various images.

CO6. discuss various color models, shading methods, animation and digital image processing.

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OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
150304/160304 (DC-4)

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.

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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HARDWARE LAB
150305/160305 (DLC-1)

COURSE OBJECTIVES

- To understand various number systems, boolean algebra, logic gates.
- To acquire the knowledge of a computer system, motherboard and its processing unit.
- To be aware of different memories, I/O devices, windows installation and SMPS.

Unit -I

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

Unit-II

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

Unit -III

Sequential Circuits, Latches, Flip-Flops: Edge-Triggered D Flip-Flop, Edge-Triggered JK Flip-Flop, JK Master-Slave Flip-flop, Registers. Integrated Circuits.

Unit-IV

Introduction of Motherboard, Types of Motherboard, Integrated Motherboards, Non-Integrated Motherboards, Desktop Motherboards, Server Motherboards, Laptop Motherboards, Factors of Motherboard, Components of a Motherboard, Manufacturers of Motherboards, Bus Architecture.

Unit -V

Introduction to Memory, Types of Memory, Installation and Partition of Hard Disk, Working of Hard Disk. Basics of I/O Devices, Introduction to Ports, Identify the Different Ports, Ports Troubleshooting, Windows Installation, SMPS (Switch Mode Power Supply).

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.
- The Indispensable PC Hardware Book, Hans-Peter Messmer, Third Edition.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. illustrate the concept of number system and boolean algebra.

CO2. demonstrate installation of windows and connections through ports at basic level.

CO3. build various circuits and inspect their working.

CO4. examine the ICs specifications and their functioning.

CO5. explain the concept of memory, motherboard, bus, and SMPS.

CO6. choose appropriate logic gates to design combinational & sequential circuits.

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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 :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's Single Source Shortest Path Algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, 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.

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, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto 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.

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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 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.

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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 form 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 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.

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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

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.

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CYBER SECURITY
100004 (MC-2)

COURSE OBJECTIVES

- To provide an understanding of cyber security fundamentals.
- To analyze various cyber attacks and their countermeasures.
- To provide basics of Internet and networking.
- To identify various cyber security threats and vulnerabilities.
- To apply forensic science to investigate a cyber crime.

Unit-I

Introduction- Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

Unit-II

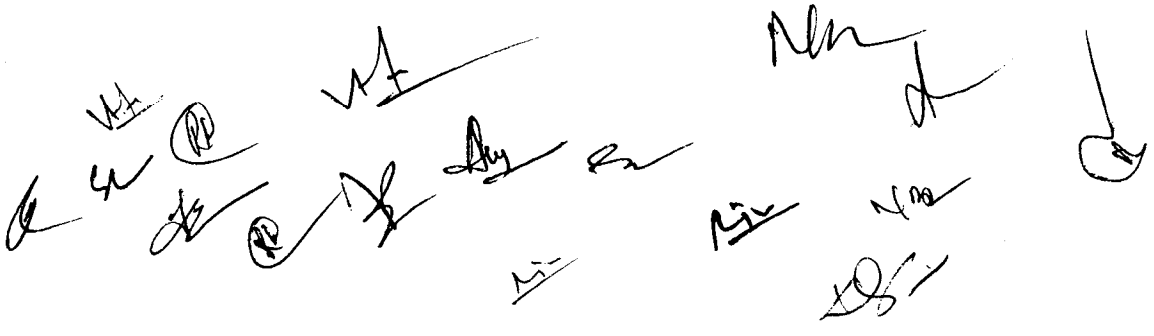
Basics of Internet & Networking- Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

Unit-III

Cryptography and Network Security- Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric key and Public key cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

Unit-IV

Cyber Security Threats and Vulnerabilities- Hacker, Types of Hacker- White, Gray and black, **Malicious Software's-** Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.



Unit-V

Cyber Crime Investigation and Legal Issues: Intellectual property, privacy issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

RECOMMENDED BOOKS

- Cryptography and Network Security, 4/E, William Stallings, 4th edition, Pearson publication.
- Computer Security: Principles and Practice, Stallings William, Pearson publication.
- Investigating Network Intrusions and Cybercrime, EC-Council Press.
- Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.
- Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.

COURSE OUTCOMES

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

CO1. Tell the basic terminologies of Cyber Security.

CO2. Explain the basic concept of networking and Internet.

CO3. Apply various methods used to protect data in the internet environment in real world situations.

CO4. Discover the concept of IP security and architecture.

CO5. Compare various types of cyber security threats/vulnerabilities.

CO6. Develop the understanding of cyber crime investigation and IT ACT 2000.

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PROGRAMMING LAB
(JAVA PROGRAMMING)
150405/160405 (DLC-3)

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in java, including defining classes, invoking methods, using class libraries, etc.
- To acquire the ability to write a computer program to solve specified problems.
- To be able to use java SDK environment to create, debug and run simple java programs.

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package Access, Variables and Data Types, Conditional and Looping Constructs, Arrays.

Unit-II

Object-Oriented Programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading Methods, Nested Classes, Overriding Methods, Polymorphism, Making Methods and Classes Final, Wrapper Classes.

Unit-III

Extending Classes and Inheritance: Types of Inheritance in Java, Abstract Classes and Methods, Interfaces, Use of 'Super', Polymorphism in Inheritance. Garbage Collection in Java.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer Class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.

Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for Various Controls such as Label, Choice, List, Checkbox, etc., Dialogs and Frames using Menus.

Basic Concepts of Networking: Working with URLs, Concepts of URLs and Sockets. Basics of Database Connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
- JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
- JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schidt.

COURSE OUTCOMES

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

CO1. tell the available features in Java programming language.

CO2. illustrate Java programming constructs in solving problems.

CO3. make use of Java programming language for creating databases.

CO4. test for bugs in a software application written in Java programming language.

CO5. determine different ways for handling exception, memory management, file handling, I/O management and internet based application development.

CO6. build a project for application development using Java programming language.

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SOFTWARE ENGINEERING
150502/160502 (DC-9)

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), The 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 (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 & 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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THEORY OF COMPUTATION
150503/160503 (DC-10)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages.
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of Automata Machines, Finite Automata as a Language Acceptor and Translator, Moore Machines and Mealy Machines, Composite Machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic Finite Automata Machines, Conversion of NDFA to DFA, Minimization of Automata Machines, Regular Expression, Arden's Theorem. Meaning of Union, Intersection, Concatenation and Closure, 2 Way DFA.

Unit-III

Grammars: Types of Grammar, Context Sensitive Grammar, Context Free Grammar, Regular Grammar. Derivation Trees, Ambiguity in Grammar, Simplification of Context Free Grammar, Conversion of Grammar to Automata Machine and Vice Versa, Chomsky Hierarchy of Grammar, Killing Null aqnd Unit Productions. Chomsky Normal Form and Greibach Normal Form.

Unit-IV

Push DOWN Automata: Example of PDA, Deterministic And Non-Deterministic PDA, Conversion of PDA into Context Free Grammar And vice versa, CFG Equivalent to PDA, Petrinet Model.

Unit-V

Turing Machine: Techniques for Construction. Universal Turing Machine Multitape, Multihead and Multidimensional Turing Machine, N-P Complete Problems. Decidability and Recursively Enumerable Languages, Decidability, Decidable

Languages, Undecidable Languages, Halting Problem of Turing Machine & The Post Correspondence Problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

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

CO1. explain the basic concepts of switching and finite automata theory & languages.

CO2. relate practical problems to languages, automata, computability and complexity.

CO3. construct abstract models of computing and check their power to recognize the languages.

CO4. analyse the grammar, its types, simplification and normal form.

CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application.

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MICROPROCESSOR & INTERFACING
150504/160504 (DC-11)

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 Microprocessors, RISC and CISC Processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and Maximum Mode Signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, Interfacing with LED's, ADC, DAC, Stepper Motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 Programmable Interval Timer, 8259A Programmable Interrupt Controller and 8257 DMA Controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel Data Transmission, Types of Communication System, Baud Rate RS-232C, Modem and various Bus Standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output Configurations, Interrupts, Addressing Modes, Overview of 8051 Instruction Set.

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

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

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.

CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.

CO3. demonstrate the concept of interfacing with peripheral devices.

CO4. make use of different interrupts and addressing modes.

CO5. design an interfacing for I/O devices.

CO6. build a system based on 8086 microprocessor and 8051 microcontroller.

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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.

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. Louden, 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.

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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 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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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 Steam 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 Polices.

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.

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IMAGE PROCESSING
150612/ 160612(DE-1)

COURSE OBJECTIVES

- To understand the fundamentals of image acquisition, image processing in various domains.
- To understand image transformation, enhancement and restoration techniques used in image processing.
- To know image registration and segmentation used in image processing.

Unit- I

Introduction and Fundamentals: Introduction to Image Processing Systems, Digital Image Fundamentals: Components of Digital Image Processing System, Image Model, Imaging Geometry, Sampling and Quantization of Images, Classification of Digital Images, Zooming and Shrinking, Relationship Between Pixels.

Unit- II

Image Enhancement in Spatial Domain: Introduction, Basic Gray Level Function, Piecewise Linear Transformation, Contrast Stretching, Histogram Specification, Histogram Equalization, Local Enhancement using Arithmetic and Logical Operation- Image Subtraction, Image Averaging Image Smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image Sharpening.

Unit- III

Image Enhancement in Frequency Domain: Introduction to Fourier Transform, Filters: Low Pass and High Pass, Gaussian Filters, Homomorphic Filtering.

Image Restoration- Model of Image Degradation/Restoration Process, Noise Models, Noise Reduction in Spatial Domain and Frequency Domain, Inverse Filtering, Mean Filters, Least Mean Square(Wiener) Filtering, Fir Wiener Filter.

Unit -IV

Morphological Image Processing: Logic Operation Involving Binary Images, Dilation And Erosion, Opening and Closing, Morphological Algorithms: Boundary

Extraction, Region Filling, Extraction Of Connected Components, Convex Hull, Thinning, and Thickening.

Unit -V

Image Registration: Introduction, Geometric Transformation, Plane to Plane Transformation, Mapping.

Image Segmentation: Introduction, Region Extraction, Pixel Based Approach, Multilevel Thresholding, Local Thresholding, Region Based Approach, Region Growing, Splitting and Merging, Edge and Line Detection, Corner Detection, Detection of Discontinuities, Edge Linking and Boundary Detection.

RECOMMENDED BOOKS

- Digital Image Processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
- Fundamentals of Digital Image Processing, K. Jain, Pearson Education.
- Digital Image Processing, S. Esakkirajan, S. Jayaraman, T. Veerakumar, Tata McGraw-Hill Education.

COURSE OUTCOMES

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

CO1. define different modalities and current techniques in image processing.
CO2. classify spatial and frequency domain techniques used in image processing.
CO3. apply image processing techniques to enhance visual images.
CO4. analyse the constraints in image processing when dealing with real problems.
CO5. evaluate various enhancement, restoration and retrieval techniques of image processing.
CO6. design a system using the mathematical models and principles of digital image processing for real world problems.

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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 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 Schawber, 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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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

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison betwcen 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.

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.

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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.

OPEN CATEGORY (OC-1) OFFERED IN VI SEMESTER

Unit V

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

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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 (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.

OPEN CATEGORY (OC-1) OFFERED IN VI SEMESTER