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

ANNEXURE – I

Syllabi
of
Departmental Elective (DE) Courses
B.Tech VII Semester
(Computer Science & Engineering)
Under Flexible Curriculum
[ITEM-1]

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

NETWORKING WITH TCP/IP
150711 (DE-3)

COURSE OBJECTIVES

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

Unit-I

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

Unit-II

IP Layer: Connection Oriented & Connection less Internet Working, IPV4 Addressing, Subnetting, Supernetting. Delivery and Forwarding of IP Packets, IPv4,IPV6, ARP, RARP, ICMPv4, IGMP, Mobile IP, Unicast Routing Protocols (RIP, OSPF, and BGP), Multicasting and Multicast Routing Protocols.

Unit-III

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

Unit- IV

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

Unit-V

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

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.

Department of Computer Science and Engineering

DATA MINING & WAREHOUSING
150712 (DE-3)

COURSE OBJECTIVES

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

Unit - I

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

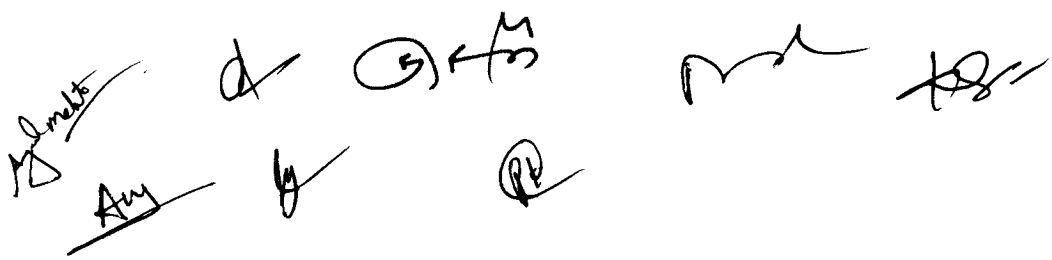
RECOMMENDED BOOKS

- 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. 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 and Engineering

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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Annexure-2

Scheme of

B.Tech VII

For batch admitted 2018-19

(Computer Science & Engineering)

Under Flexible Curriculum

[Item-1]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. VII Semester (Computer Science and Engineering) *for batch admitted in Academic Session 2018-19*

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	2	-	-	2
3.	OC	OC	Open Category (OC-2)	70	20	10	-	-	-	-	100	2	1	-	3
4.	OC	OC	Open Category (OC-3)	70	20	10	-	-	-	-	100	3	-	-	3
5.	100008	MC	Intellectual Property Rights (IPR) (MC)	70	20	10	-	-	-	-	100	2	-	-	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**	**12**	**1**	**10**	**18**
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.	150711	Networking with TCP/IP
2.	150712	Data Mining & Warehousing
3.	150713	Distributed Systems

DE -4*

S. No.	Subject Code	Subject Name
1.	150754	Cloud Computing
2.	150755	Deep learning - IITRopar
3.	150756	Software Testing

OC-2

S. No.	Subject Code	Subject Name
1.	900208	Soft Computing
2.	900209	Network Security

OC-3

S. No.	Subject Code	Subject Name
1.	900220	R Programming
2.	900222	Computer Networks

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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List of courses to be opted for Honours or Minor specialization in VII Semester

Honours* *(to be opted by students of Parent Department)*	Minor Specialization* *(to be opted by students of Other Department)*
Deep Learning for Computer Vision	Computer Graphics
Big Data Computing	Theory of Computation
Parameterized Algorithms	Software Testing

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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Annexure-3

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

[ITEM-3]

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

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.

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 and Engineering

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, Linus and Mac.

RECOMMENDED BOOKS

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

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 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- 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.

COURSE OUTCOMES

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

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

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Annexure-4(a)

Scheme of

B.Tech V

For batch admitted 2019-20

(Computer Science & Engineering)

Under Flexible Curriculum

[Item-V]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

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

For batches admitted in Academic Session 2019-20

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End Sem.	Mid Sem Exam.	Quiz/ Assisgnment	End Sem.	Lab work & Sessional					
1.	100005*	HSMC-4	Ethics, Economics, Entrepreneurship& Management	70	20	10	-	-	100	3	-	-	3
2.	150501	BSC- 6	Discrete Structures	70	20	10	-	-	100	3	1	-	4
3.	150502	DC-9	Software Engineering	70	20	10	30	20	150	2	1	2	4
4.	150503	DC-10	Theory of Computation	70	20	10	30	20	150	2	1	2	4
5.	150504	DC-11	Microprocessor & Interfacing	70	20	10	30	20	150	2	1	2	4
6.	150505	DLC-3	Minor Project-I**	-	-	-	30	20	50	-	-	2	1
7.	150506	DLC-4	Summer Internship Project-II (Evaluation)	-	-	-	25	-	25	-	-	6	3
8.	150507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)*	-	-	-	-	25	25	-	-	2	1
Total				**350**	**100**	**50**	**145**	**105**	**750**	**12**	**4**	**16**	**24**
9.	100006^	MC-3	Indian Constitution & Traditional Knowledge (Audit Course)	70	20	10	-	-	100	3		-	03
Department level activity/workshop/awareness programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics													
Additional Course for Honours or minor Specialization			**Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization**										

*** Group A/B programmes will offer this course in V/VI Semester respectively.**

^ Group A/B programmes will offer this course in V/VI Semester respectively. (This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)

**** The minor project-I may be evaluated by an internal committee for awarding sessional marks.**

*** Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation**

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

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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List of courses to be opted for Honours or Minor specialization in V Semester

Honours* *(to be opted by students of Parent Department)*	Minor Specialization* *(to be opted by students of Other Department)*
Cloud computing	Programming in C++
Advanced computer architecture	Programming. Data Structures and Algorithms in Python
The Joy of Computing using Python	Introduction to Operating Systems
	Cloud Computing

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

For Sr No8 in Scheme of Vth Sem

150507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)*	**Course ID:** noc21-cs78	Python for Data Science
			Course ID: noc21-cs103	Introduction to Quantum Computing: Quantum Algorithms and Qiskit
			Course ID: noc21-mg57	Gender justice and workplace security
			Course ID: noc21-mg74	Decision-Making Under Uncertainty

Annexure – 4(b)

Syllabi
of
Departmental Core (DC) Courses
B.Tech V Semester
(Computer Science and Engineering)
Under Flexible Curriculum
[Item-5]

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

SOFTWARE ENGINEERING
150502 (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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Department of Computer Science and Engineering

THEORY OF COMPUTATION
150503 (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 to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, 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. Pumping lemma, applications, Closure properties of regular languages, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, context free grammar, and regular grammar, Derivation trees, Rightmost and Leftmost derivations of Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar,. Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

Unit-IV

Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Empty stack, Designing of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Context sensitive language and linear bounded automata (LBA).

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, decidable languages, un decidable languages. Halting problem of Turing machine & the post correspondence problem (PCB).

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 the abstract models for engineering applications using automata theory, and languages

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

Department of Computer Science and Engineering

MICROPROCESSOR & INTERFACING
150504 (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. An 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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Annexure-5(a)

Scheme of

B.Tech III & IV Semester

For batch admitted 2020-21

(Computer Science and Engineering)

Under Flexible Curriculum

[Item-7]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination
B.Tech. III Semester (Computer Science and Engineering)

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	Mode of Teaching (Offline/Online)	Mode of Exam
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation			L	T	P			
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill based mini project							
1.	100025	BSC	Engineering Mathematics-II	50	10	20	20	-	-	-	100	3	-	-	3	Offline (3/0)	PP
2.	150311	DC	Computer System Organization	50	10	20	20	-	-	-	100	2	1	-	3	Blended(2/1)	PP
3.	150312	DC	Operating Systems	50	10	20	20	-	-	-	100	2	1	-	3	Blended(2/1)	PP
4.	150313	DC	Computer Graphics	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
5.	150314	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
6,	150315	DLC	Computer Hardware & Troubleshooting Lab	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
7.	150316	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-		40		40			2	1	Online + Mentoring	SO
8.	200XXX	CLC	Novel engaging courses	-	-	-	-	50			50	-	-	2	1	Interactive	SO
9.	150317	DLC	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	-	60			60			4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	11	4	16	23		-
10.	1000002	MAC	Biology for Engineers (Mandatory Audit Course)$$	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

MCQ: Multiple Choice Question **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper SO: Submission &Oral CLC:College level course

#compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation, Additional Foundation course for branch change students, AC-06 dated05/12/2020

*subjects which are of more theoretical in nature , **subjects which are of more designing/algorithmic/computational in nature,***subjects which are of partially computational/design /programming nature (i.e. conceptual building part can be covered in online mode + computing /design part in offline mode or for MOOC based courses, the mentoring slot can be treated as offline mode delivery of partial contents to make the teaching learning "Blended"),$Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance ,one minute paper writing etc. in that particular course/subject,$$ Course will run for Group A/B in III/IV semester respectively. Passing is optional; however, a separate mark sheet will be issued to those who qualify.

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/ SLP/ NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
3	-	8	4	7	1	17	-	-	2	4	23
13.04	-	34.78	17.39	30.43	4.34	73.91	-	-	8.69	17.39	Credits %

2/4/2021 (ACADEMICS) M.I.T.S

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. IV Semester (Computer Science and Engineering)

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	Mode of Teaching (Offline/Online)	Mode of Exam
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation			L	T	P			
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill based mini project							
1.	150411	DC	Computer Networks	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
2.	150412	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	150413	DC	Software Engineering	50	10	20	20	-	-		100	3	-	-	3	Blended (2/1) MCQ	~~PP~~ MCQ
4.	150414	DC	Theory of Computation	50	10	20	20	-	-		100	2	1	-	3	Blended (2/1)	PP
5.	150415	DLC	Programming Lab* Python Programming	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
6.	150416	DC	Discrete Structures	50	10	20	20	-	-	-	100	3	-	-	3	Offline (3/0)	PP
7.	2000XXX	CLC	Novel engaging courses					-	50		50	-	-	2	1	Interactive	SO
Total				250	50	100	100	180	110	60	850	13	2	10	20		
8.	1000001	MAC	Indian Constitution and Traditional Knowledge(Mandatory Audit Course) $$	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ
	Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester																

MCQ: Multiple Choice Question **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper SO: Submission & Oral CLC: College level course

#compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation,

*subjects which are of more theoretical in nature , **subjects which are of more designing/algorithmic/computational in nature,***subjects which are of partially computational/design /programming nature (i.e. conceptual building part can be covered in online mode + computing /design part in offline mode or for MOOC based courses, the mentoring slot can be treated as offline mode delivery of partial contents to make the teaching learning "Blended"),$Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance ,one minute paper writing etc. in that particular course/subject,$$ Course will run for Group A/B in III/IV semester respectively. Passing is optional; however, a separate mark sheet will be issued to those who qualify.

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/ SLP/ NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
3	-	8	4	4	1	~~17~~ 14	-	- 03	2	1	20
15	-	40	20	20	5	~~85~~ 70	-	- 15	10	5	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of CSE

OOP and Methodology (150212)

LIST OF SKILL-BASED MINI-PROJECTS

1. 'Movie World' Shop has a huge collection of movies (in the form of DVDs). You are required to make software using OOPS paradigm that manages the rental operations of movies.
2. Question Bank computerizes the MCQ based exams. It takes input from a file having questions and their answers and presents randomly before the exam takers. Use OOPS concepts to implement the question bank system.
3. Design an OOPS to implement the basic operations of Leave Management System.
4. An Inventory System computerizes the Stock, Sale and Purchase of goods. Design an OOPS to implement it.
5. An electricity board charges the following rates to domestic users to discourage large consumption of energy: For the first 100 units - 60P per unit For next 200 units - 80P per unit Beyond 300 units - 90P per unit All users are charged a minimum of Rs.50.00. if the total amount is more than Rs.300.00 than an additional surcharge of 15% is added. Design an OOPS system to register users to the system, maintain his/her record and display monthly bills.
6. Library Systems is aimed to computerize the library management operations, e.g. Registering a Student, Issuing a book, Handling Books Return, etc. Design an OOPS system to implement the same.
7. Design an OOPS to implement a Personal Diary Management System.

Please Note: *Each project has to be submitted by a group of 3 to 4 students, and each group will be assigned only one project.*

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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List of Courses offered for Self-Study/Seminar in III Sem (2020 admitted batch)

150316	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	Course ID: noc21-cs81	C Programming and Assembly Language
			Course ID: noc21-hs70	Patent Drafting for Beginners
			Course ID: noc21-ge18	Stress Management
			Course ID: noc21-mg74	Decision-Making Under Uncertainty

Annexure-5(b)

Syllabi of
Departmental Courses (DC) Courses
B.Tech III Semester
For batch admitted 2020-21
(Computer Science and Engineering)
Under Flexible Curriculum
[Item-7]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR-474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Department of Computer Science and Engineering

COMPUTER SYSTEM ORGANIZATION
150311 (DC)

COURSE OBJECTIVES

- 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-Neumann 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 Micro programmed 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.

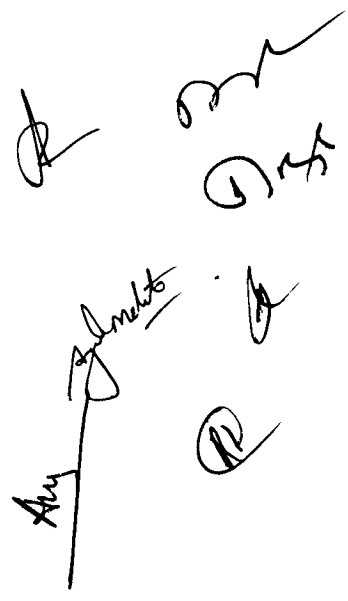
RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar,
- 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. Explain different memories and the functional units of a processor.
CO3. Explain the concept of working of microprocessor, multiprocessor and pipelining.
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.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Department of Computer Science and Engineering

OPERATING SYSTEMS
150312 (DC)

COURSE OBJECTIVES

- Provide basic knowledge of computer operating system structures and functioning.
- Compare several different approaches to memory management, file management and process management
- Understand various problems related to concurrent operations and their solutions.

Unit- I

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

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

Unit-II

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-III

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-IV

Storage management: Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, RAID Structure.

Unit-V

File system interface: File Concept, Access Methods, Directory Structure, File System Structure, Allocation Methods, and Free-Space Management.
System Protection: Goals. Principles. Domain of Protection. Access Matrix. Access Control.

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. Outline the basic concept of operating systems
CO2. Analyze the working of operating system
CO3. Examine the working of various scheduling/allocation approaches
CO4. Measure the performance of various scheduling/allocation approaches
CO5. Analyze the various operating system problems/issues
CO6. Develop the Solution of various operating system problems/issues

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
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Department of Computer Science and Engineering

COMPUTER GRAPHICS
150313(DC)

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

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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, And 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.

Unit-IV

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-V

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, and Color Models like RGB, YIQ, CMY, HSV etc., and Introduction to Digital Image Processing (DIP), Fundamental Steps and Components of DIP.

RECOMMENDED BOOKS

- Computer Graphics, Donald Hearn and M.P. Becker, PHI Publication.
- Computer Graphics principle and Practice, FoleyVandam, Feiner, Hughes.
- Principles of Computers Graphics, Rogers, TMH.
- Computer Graphics, Sinha and Udai, TMH.
- Digital Image Processing, 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 and shape Generation algorithms.
CO3. Apply various 2-Dimensional and 3-Dimensional transformations and projections on Images.
CO4. Classify methods of image clipping and various algorithms for Line and Polygon clipping.
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.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
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Department of Computer Science and Engineering

COMPUTER GRAPHICS
150313(DC)

List of Experiments

1. Installation and Introduction to OpenGL basics, graphic functions, commands for compiling and executing an OpenGL Program.
2. Write an OpenGL Program to create an output window, to plot a point with given coordinates and other basic demonstrations.
3. Write an OpenGL Program to implement DDA Line Drawing Algorithm.
4. Write an OpenGL Program to implement Bresenham Line Algorithm.
5. Write an OpenGL Program to implement Mid-Point Circle Algorithm.
6. Write an OpenGL Program to implement following 2D transformations:
   i. Translation of a point, line and polygon.
   ii. Scaling of a line and polygon.
   iii. Rotation of a line and polygon around origin.
7. Write an OpenGL Program to implement:
   i. Flood Filling Algorithm using polygon.
   ii. Boundary Filling Algorithm using polygon.

COURSE OUTCOMES
After completion of the course students will be able to:

CO1. Demonstrates the fundamental concepts of Computer Graphics and its applications.
CO2. Explain and use hardware's and software's component of computer graphics
CO3. Apply various image generation, manipulations and color model techniques in coding.
CO4. Implement algorithms for create and manipulate image in programs.
CO5. Develop the ability to write computer programs for create image and animation using graphics concepts.
CO6. Develop application programs and projects in terms of image and animation using computer graphics.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
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Department of Computer Science and Engineering

DESIGN & ANALYSIS OF ALGORITHMS
150314 (DC)

COURSE OBJECTIVE:

- To introduce the topic of algorithms as a precise mathematical concept.
- To demonstrate the familiarity with major algorithm design paradigms and methods of analysis.
- To design efficient algorithms for common computer engineering problems.
- To enhance the skills using well-known algorithms and data structures for solving real-life problems.

Unit-I

Introduction to Computational Model: RAM model, Algorithms and its importance, Recurrences and Asymptotic Notations, Growth of function, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, Basic Tree and Graph Concept: Binary Search Trees, Height Balanced Tree, 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, greedy activity selection. **Minimum Cost Spanning Trees**: Prim's and Kruskal's Algorithm, knapsack Problem, Single Source Shortest Path: Dijkstra's single source shortest path algorithm, Huffman Coding.

Unit-IV

Dynamic Programming: Introduction, The principle of Optimality, Examples of Dynamic Programming Methods such 0/1 Knapsack, Travelling salesman problem, Floyds All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

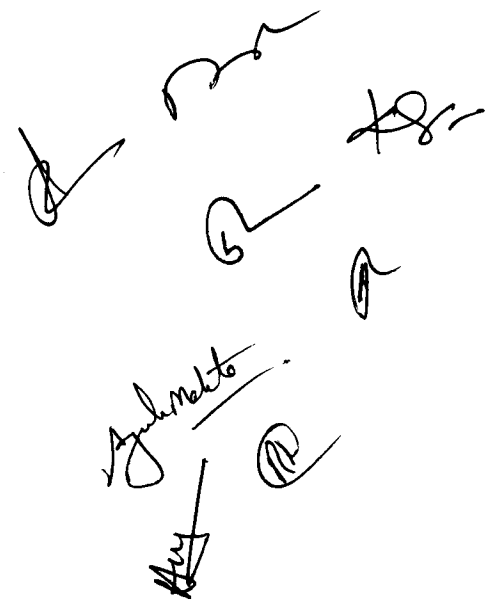
Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch and Bound**: Introduction and its Examples like Travelling Salesperson Problem etc. **NP Completeness**: Introduction, Class P and NP, Polynomial Reduction,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

RECOMMENDED BOOKS:

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press
- Introduction to Algorithms, Coreman Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullman, 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 Algorithms.
CO2: Outline major Algorithms and Data Structures.
CO3: Apply various algorithmic design paradigms.
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, branch and bound approach.



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Department of Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHM
150314(DC)

List of Programs

1. WAP to implement the following using array as data structure and analyze its time Complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort
   e. Bucket sort f. Radix sort g. Heap sort h. Merge sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time Complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming.

COURSE OUTCOMES

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

CO1. Relate the principles of algorithm design in solving problems.
CO2. Demonstrate basic algorithms and different problem solving strategies.
CO3. Build creativeness and confidence to solve non-conventional problems.
CO4. Analyze running times of algorithms using asymptotic analysis.
CO5. Compare various algorithm design approaches for solving real world problems.
CO6. Design and implement optimization algorithms in specific applications

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
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Department of Computer Science and Engineering

COMPUTER HARDWARE & TROUBLESHOOTING LAB
150315 (DLC)

COURSE OBJECTIVES:

- To understand the components on the motherboard.
- To perform system administration tasks.
- To be aware of different memories, I/O devices, installation and SMPS.
- To understand system related problems and methods of troubleshooting

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Unit-I

Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, SSD, CD, DVD and add on cards. Front panel indicators & switches and Front side & rear side Connectors.

Unit-II

Understanding of Motherboard and its interfacing component.

Unit-III

Install and configure computer drivers and system components. Disk formatting, Partitioning, Disk Image, Clone and Disk operating system commands, Disassembly and Reassembly of hardware. BIOS, Overclocking, Booting with USB/CD.

Unit-IV

Install, upgrade and configure Windows and Linux operating systems.

Unit -V

Remote desktop connections and file sharing. Identify, install and manage network connections -Configuring IP address and Domain name system. Installation of printer and scanner software. Using Disk Defragmenter, Check Disk and Disk Clean-up, Window restore point, Window Registry, Troubleshooting and Managing Systems.

RECOMMENDED BOOKS:

- Craig Zacker & John Rourke, "The Complete Reference:PC hardware", New Delhi, Tata McGraw-Hill
- Mike Meyers, "Introduction to PC Hardware and Troubleshooting", New Delhi, Tata McGraw-Hill

COURSE OUTCOMES:

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

CO1. Outline the features and functions of motherboard, BIOS and Storage devices.
CO2. Assemble personal computer
CO3. Create partitioning of hard disk.
CO4. Install system and application software.
CO5. Configure network, Printer, Scanner and other devices.
CO6. Troubleshoot and Managing Systems

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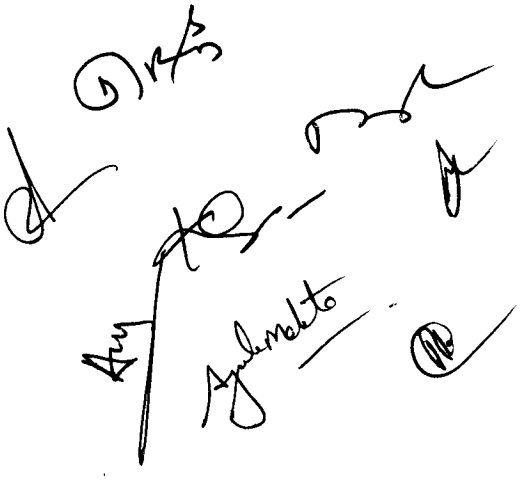
Department of Computer Science and Engineering

COMPUTER HARDWARE & TROUBLESHOOTING LAB
150315 (DLC)

List of Experiments

1. Study the different parts of computer system.
2. Study different parts of motherboard
3. Study various types of connectors.
4. Draw the pin details of various connectors.
5. Study of CMOS setup and PC Troubleshooting.
6. Partition and format the hard disc
7. Installation of OS: Linux and windows
8. Connect systems in network using switch
9. Connect the systems in peer-to-peer network
10. Configure e-mail client and e-mail server
11. Configure browser for Internet access using proxy server
12. Configure Virtual Private Network (VPN)
13. Create Disk Image/Clone.
14. Overclocking, Booting with USB/CD.
15. Using Disk Defragmenter, Check Disk and Disk Clean-up, Window restore point and Window Registry



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Syllabi of
Departmental Courses (DC) Courses
B.Tech IV Semester
(Computer Science and Engineering)
Under Flexible Curriculum

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Department of Computer Science and Engineering

COMPUTER NETWORKS
150411 (DC)

COURSE OBJECTIVES

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

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, Modem, Proxy Server, Wireless router, & Wireless Access Point (WAPs). Performance Criteria- Bandwidth, Throughput, Latency (Delay), Propagation Time, Transmission time & Queuing Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star Topology & Mesh, Switching- Circuit switching, Message switching & Packet switching, Multiplexing; FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing, Wireless transmission- Electromagnetic spectrum, Radio transmission & Microwave transmission.

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,CSMA/CA, IEEE 802.3 frame format.

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, Port addressing basics.

Unit-V

Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption & Compression. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

RECOMMENDED BOOKS

- Behrouz A. Forouzan "Data Communication and Networking", McGraw – Hill Publications.
- Andrew Tanenbaum – Computer Networks, PHI
- Peterson and Davie, "Computer Networks, A systems Approach", 5th ed., Elsevier, 2011.
- Ying-Dar Liu, Ren-Hwang, Fred Baker, "Computer Networks: An open Source Approach", McGraw – Hill, 2001.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Outline the Data Communications System and its components.
CO2. Identify the different types of network topologies and protocols.
CO3. Enumerate the layers of the OSI model and function(s) of each layer.
CO4. Identify the different types of network devices and their functions within a network
CO5. Analyze the problems associated with various networking protocols and measure the Performance
CO6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

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COMPUTER NETWORKS
150411 (DC)

List of Experiments

1) Study of different types of network cables and practically implement cross wired cable and straight through cable using clamping tool.
2) Install and configure Network Devices: HUB, Switch and Routers.
3) Configure Internet connection and use Ipconfig, tracert, ping, arp and Netstat utilities to debug the network issues.
4) Configure a Network topology using simulation software.
5) Simulation and analysis of Error and Flow Control protocols.
6) Simulation & Analysis of Routing Protocols.
7) Network Traffic flow analysis using Wireshark utility.
8) Installation and working of web proxy software's(CCproxy).
9) Data transfer between two systems using Socket programming
10) Simulate stop and wait protocol using Socket programming.

COURSE OUTCOMES

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

CO1. Outline various techniques for encoding, decoding and digital data communication.

CO2. Analyze network topologies and Protocols.

CO3. Configure various networking devices and softwares.

CO4. Design and Simulate networking protocols.

CO5. Design Error Control and Flow Control techniques.

CO6. Troubleshot networking issues.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
150412 (DC)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts & normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.
Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc. Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control. Concurrent operation of Databases. Recovery. Types of Recovery. Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools.

RECOMMENDED BOOKS

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

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Define the terminology, features, classifications, and characteristics embodied in database systems.

CO2. Identify different issues involved in the design and implementation of database system.

CO3. Analyse database schema for a given problem domain.

CO4. Justify principles for logical design of databases, including the E R modelling and Normalization approach.

CO5. Apply transaction processing concepts and recovery methods over real time data.

CO6. Formulate, using relational algebra and SQL, solutions to a broad range of query Problems.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
150412 (DC)
List of Experiments

1. Implementation of DDL commands of SQL with suitable examples
    1. Create table
    2. Alter table
    3. Drop table
2. Implementation of DML commands of SQL with suitable examples
    1. Insert
    2. Update
    3. Delete
3. Implementation of different types of function with suitable examples
    1. Number function
    2. Aggregate function
    3. Character function
    4. Conversion function
    5. Date function
4. Implementation of different types of operators in SQL
    1. Arithmetic operators
    2. Logical operators
    3. Comparison operators
    4. Set operation
5. Implementation of different types of joins
    1. Inner join
    2. Outer join
    3. Natural join
6. Study and implementation of
    1. Group by and having clause
    2. Order by clause
    3. Indexing
7. Study and implementation of
    1. Sub queries
    2. Views
8. Study and implementation of different types of constraints.
9. Study and implementation of Database Backup and Recovery commands. Study and implementation of Rollback, Commit, Savepoint.

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Department of Computer Science and Engineering

SOFTWARE ENGINEERING
150413 (DC)

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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Department of Computer Science and Engineering

THEORY OF COMPUTATION
150414 (DC)

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 to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, 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. Pumping lemma, applications, Closure properties of regular languages, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, Rightmost and Leftmost derivations of Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar,. Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

Unit-IV

Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack, Example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA.

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 (PCB).

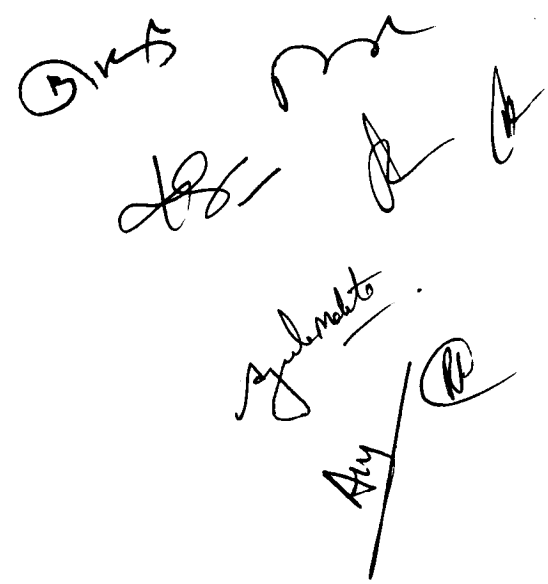
RECOMMENDED BOOKS

- 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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Department of Computer Science and Engineering

PROGRAMMING LAB.
150415(DLC)
Python Programming

COURSE OBJECTIVES

- To understand components of Python Program
- To learn the basic construct of python programming for solving real world research-based problems.
- To visualize and analyze data using python libraries

Unit -I

Setting up programming environment, running python programs from a terminal, variables and simple data types: variables, strings, numbers and maths, comments, conditional statements.

Unit -II

Introducing loops, working of input function, various operations on Tuples, lists, Set and Dictionary, Loops, Conditional Statement,

Unit -III

Built in function, defining a function, passing arguments, return value, lambda function, exception handling

Unit -IV

Object oriented programming, Creating and using class and object, methods, inheritance, debugging.

Unit V

Working with packages, pandas, NumPy, Matplotlib and scikit-learn

RECOMMENDED BOOKS

- Java: The Complete Reference Hebert Schildt, Mc Graw Hill.
- Object-Oriented Programming with C++ and Java Debasis Samanta, Prentice Hall India.

COURSE OUTCOMES

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

CO1. Tell the use of various built-in data structures used in python.

CO2. Outline the working of file handling operations, normal functions and lambda functions in python.

CO3. Apply the concepts of object oriented programming in python.

CO4. Analyze the data and visualize it using python's matplotlib.

CO5. Rule out various important characteristics of data using scikit-learn package.

CO6. Create efficient algorithms in python to solve real world problems.

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Department of Computer Science and Engineering

PROGRAMMING LAB.
150415(DLC)
Python Programming

List of Experiments

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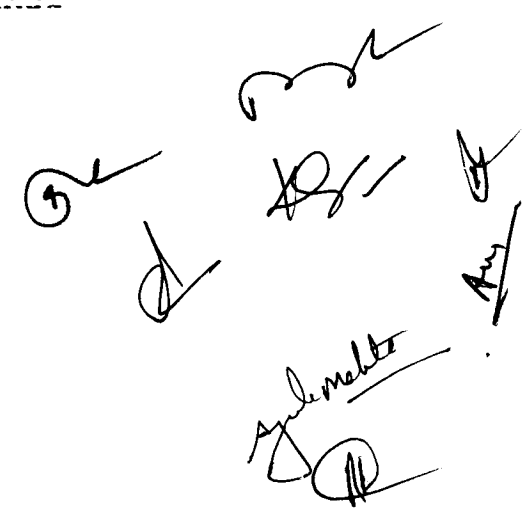
1. Python program to take input from user and display "Hello MITS Gwalior".
2. Python program to do arithmetic operations.
3. Python program to find area of rectangle, circle and triangle.
4. Python program to check number is even or odd, prime not prime.
5. Python program find factorial of a number.
6. Python program to check year is leap year or not.
7. Python Program to implement the operation on List, Tuple, Set and Dictionary.
8. Python Program to handle the exception and file handling operation.
9. Python Program to create and use of user defined function.
10. Python Program to solve a problem using Lambda function
11. Python Program for creating an object with and without inheritance.



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Department of CSE

DISCRETE STRUCTURES
150416

COURSE OBJECTIVES:

- To perceive the knowledge of basic algebra
- To use logical notation to define fundamental mathematical concepts
- To familiarize predicate & propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function.

Unit 1:

Finite and infinite sets, mathematical induction, Principles of inclusion and exclusion, functions and relations, summations, binary relations, equivalence relations, Congruence Relation and partitions, partial ordering relations and lattices, Pigeonhole principle.

Unit 2:

Propositional logic, syntax, semantics of Atf (atomic formula), Wff'(well formed formula's),validity and satisfiability of wff' by Quine's method, Normal and closure form of prepositional calculus.

Unit 3:

Basic of Graph Theory as a Discrete Structure, planner graphs, Graph Coloring, multi-graphs and weighted graph, shortest path in weighted graph, Introduction to Eularian paths and circuits, Hamiltonian paths and circuits, Introduction to trees, rooted trees, Path length in rooted trees, spanning trees and cut trees.

Unit 4:

Introduction to discrete numeric functions and generating functions, Introduction to recurrence relations, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

Unit 5:

Introduction to group, subgroups, generations and evaluation of power, cosets and Lagrange's theorem, group codes, isomorphism and automorphism, homomorphism and normal sub groups, ring, integral domain and field.

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1. Understand logical notation to define and reason mathematically about the fundamental data types and structures used in computer algorithms and systems.

CO2. Outline various mathematical concepts along with their applications.

CO3. Implement the applications of various types of graphs to solve real life problem.

CO4. Apply the mathematical concepts to solve engineering problems.

CO5. Analyze the set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problem.

CO6. Design analytical skill and interpret applications of engineering in real time troubleshooting.

RECOMMENDED BOOKS:

- J. Tremblay and R. Manohar: Discrete Mathematical Structures with Application to Computer science.
- Narsingh Deo: Graph Theory.
- C.L.Liu: Discrete Mathematics.

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Department of CSE

DISCRETE STRUCTURES
150416

- K.H. Rosen: Discrete Mathematics and its Applications
- S. Lipschutz, Discrete Mathematics

Annexure-6

Experiments List/Lab manuals
of
Laboratory Courses
B.Tech V Semester
(Computer Science and Engineering)
Under Flexible Curriculum
[Item-8]

Department of Computer Science and Engineering

SOFTWARE ENGINEERING LAB
150502 (DC-9)

COURSE OBJECTIVES

- To explain methods of capturing, specifying, visualizing and analyzing software requirements.
- To understand concepts and principles of software design and user-centric approach and principles of effective user interfaces.
- To know the basics of testing and understand the concept of software quality assurance.

LIST OF EXPERIMENTS

Experiment 1: Identify the requirements from problem statements
Requirements | Characteristics of Requirements | Categorization of Requirements | Functional Requirements | Identifying Functional Requirements

Experiment 2: Estimation of project metrics using estimation techniques like COCOMO model
Project Estimation Techniques | COCOMO | Basic COCOMO Model | Intermediate COCOMO Model | Complete COCOMO Model | Advantages of COCOMO | Drawbacks of COCOMO | Halstead's Complexity Metrics

Experiment 3: Modeling UML Use Case diagrams and capturing Use Case Scenarios
Use case diagrams | Actor | Use Case | Subject | Graphical Representation | Association between Actors and Use Cases | Use Case Relationships | Include Relationship | Extend Relationship | Generalization Relationship | Identifying Actors | Identifying Use cases | Guidelines for drawing Use Case diagrams

Experiment 4: E-R modeling from the problem statements
Entity Relationship Model | Entity Set and Relationship Set | Attributes of Entity | Keys | Weak Entity | Entity Generalization and Specialization | Mapping Cardinalities | ER Diagram | Graphical Notations for ER Diagram | Importance of ER modeling

Experiment 5: Modeling UML Class diagrams and Sequence diagrams
Structural and Behavioral aspects | Class diagram | Elements in class diagram | Class | Relationships | Sequence diagram | Elements in sequence diagram | Object | Life-line bar | Messages

Experiment 6: Modeling Data Flow diagrams
Data Flow Diagram | Graphical notations for Data Flow Diagram | Explanation of Symbols used in DFD | Context diagram and leveling DFD

Experiment 7: Create flow chart for an algorithm using Raptor
Assignment, Call, Input, Output, Selection and Loop symbols

Experiment 8: Estimation of Test coverage metrics and structural complexity
Control Flow Graph | Terminologies | McCabe's Cyclomatic Complexity | Computing Cyclomatic Complexity | Optimum Value of Cyclomatic Complexity | Merits | Demerits

Experiment 9: Designing Test Suites
Software Testing | Standards for Software Test Documentation | Testing Frameworks | Need for Software Testing | Test Cases and Test Suite | Types of Software Testing | Unit Testing | Integration Testing | System Testing | Example | Some Remarks

Experiment 10: Do requirement analysis and develop Software Specification Sheet (SRS) for suggested system.

Experiment 11: To prepare time line chart/Gantt chart/PERT chart for selected software project.

Experiment 12: To perform the implementation view diagram: Component diagram for the system.

RECOMMENDED TOOLS

- Selenium
- Star UML
- UMLet
- Raptor

REFERENCE

- Virtual Labs (http://vlabs.iitkgp.ernet.in/se/)

COURSE OUTCOMES

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

CO1: demonstrate the basic concept of UML.

CO2: discuss the software development process using different tools.

CO3: display the various ways for solving different common modelling problems using UML.

CO4: use the knowledge of Software engineering and project management.

CO5: identify the vocabulary, rules and idioms of the UML and learn how to model it effectively.

CO6: design the software systems using software engineering concepts.

Department of Computer Science and Engineering

THEORY OF COMPUTATION LAB
150503 (DC-10)

LIST OF EXPERIMENTS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a Program for Mode 3 Machine
4. Design a program for accepting decimal number divisible by 2.
5. Design a program for creating a machine which accepts string having equal no. of 1's and 0's.
6. Design a program for creating a machine which count number of 1's and 0's in a given string.
7. Design a Program to find 2's complement of a given binary number.
8. Design a Program which will increment the given binary number by 1.
9. Design a Program to convert NDFA to DFA.
10. Design a Program to create PDA machine that accept the well-formed parenthesis.
11. Design a PDA to accept WCW^R where w is any string and W^R is reverse of that string and C is a Special symbol.
12. Design a Turing machine that's accepts the following language $a^n b^n c^n$ where n>0.

COURSE OUTCOMES

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

CO1: demonstrate various computational models.

CO2: construct abstract models of computing.

CO3: justify the power of abstract models in computing to recognize the languages.

CO4: Apply analytical thinking and intuition for problem solving in the related areas.

CO5: identify the limitations of computation in problem solving.

CO6: develop set of rules for syntax verification.

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Department of Computer Science and Engineering

MICROPROCESSOR & INTERFACEING LAB
150504 (DC-11)

LIST OF EXPERIMENTS

1. Write an assembly language program to perform the addition of two 8-bit number using 8085/8086 instruction set.
2. Write an assembly language program to find the sum of numbers in array of data using 8085/8086 instruction set.
3. Write an assembly language program to perform the subtraction of two 8-bit number using 8085/8086 instruction set.
4. Write an assembly language program to move data block starting at location 'X' to location 'Y' without overlap using 8085/8086 instruction set.
5. Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.
6. Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.
8. Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.
9. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using 8085/8086 instruction set.
10. Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.
11. Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.
12. Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.

COURSE OUTCOMES

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

CO1: differentiate the various types of instructions and addressing modes.
CO2: identify the Hex code/ Machine code of instructions in assembly language.
CO3: perform interfacing of various peripheral devices and memory with microprocessor.
CO4: demonstrate the arithmetic & Logical operation using instruction set of 8086/8051 microprocessor.
CO5: use of 8086/8051 for interfacing with I/O devices.
CO6: build the assembly language programs in 8086/8051 to solve real world problems.

Annexure-7

Skill based mini-project of Laboratory Courses B.Tech III Semester (Computer Science and Engineering) Under Flexible Curriculum [Item-9]

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

Department of Computer Science and Engineering

COMPUTER GRAPHICS
150313(DC)

Skill Based Projects

1. Develop a project to implement a stretch band effect. In which a user will click on the screen and drag the mouse / arrow keys over the screen coordinates. The line should be updated like rubber-band and on the right-click gets fixed.
2. Develop a project to implement the DDA algorithm for drawing line. In this project a programmer is expected to shift the origin to the center of the screen and divide the screen into required quadrants.
3. Develop a project with menu option to input the line coordinates from the user to generate a line using Symmetrical DDA algorithm, Brenham's algorithm and DDA algorithm on a single screen with different colors.
4. Develop a project to demonstrate 2D animation such as clock simulation, vehicle movement etc.
5. Develop a project to demonstrate 2D animation such as rising sun, sunset, blinking stars.
6. Develop a project to implement the bouncing ball inside a defined rectangular window.
7. Develop a project to draw Bezier and B-Spline Curves with interactive user inputs for control polygon defining the shape of the curve.
8. Develop a project to demonstrate shear transformation in different directions on a unit square situated at the origin.
9. Develop a project in which a set of lines and a rectangular area of interest is given by user, the task is to remove lines which are outside the area of interest and clip the lines which are partially inside the area.
10. Develop a small graphics editor with line, circle, parabola, hyperbola generation.

Please Note: Each project has to be submitted by a group of 2 to 4 students (Depending upon project), and each group will be assigned only one project.

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DESIGN AND ANALYSIS OF ALGORITHM
150314(DC)

Skill Based Projects

1. Develop a project to show graphical implementation of any two sorting methods.
2. Develop a GUI project for implementation of Sorting and searching methods.
3. Implement Kruskal and Prim's algorithm for solving minimum spanning tree problem on Different graphs, and on the basis of complexity analysis deduce which among them is the best suited algorithm.
4. Implement Greedy algorithm and Backtracking algorithm to find a solution for the graph coloring problem on various graphs, and on the basis of complexity analysis deduce which among them is the best suited algorithm.
5. Solve Travelling Salesman Problem using Greedy Algorithm and Brute Force Algorithms, and on the basis of complexity analysis deduce which among them is the best suited algorithm.
6. Using complexity analysis, deduce among brute force and greedy algorithm, which is better for solving 0/1 Knapsack problem.
7. Implement Merge sort, Insertion sort and Quick sort for the following cases:
   a) Unsorted list of numbers (with size of list > 100)
   b) Sorted list of numbers (with size of list > 100)
   c) Unsorted list of numbers (with size of list <= 20)
   d) Sorted list of numbers (with size of list <= 20)

   Then on the basis of complexity analysis, deduce which among them is best suited for each case.
8. Compare the Exhaustive Search Algorithm and Greedy Algorithm for solving Job Scheduling Problem.
9. Implement different shortest path algorithms on various graphs and compare the performance with each other in order to conclude the best among them.

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Department of Computer Science and Engineering

COMPUTER HARDWARE & TROUBLESHOOTING LAB
150315 (DLC)

Skill Based Project

1. Disassemble and assemble various components of the computer System.
2. Install and Configure Windows/Linux Operating System.
3. Boot System using USB/CD.
4. Install and Configure Drivers and System software such as Printer drivers, Scanner Drivers,Sound and display drivers etc
5. Install multiple operating system on a system.
6. Create the clone of the hard disk.
7. Connect few systems using network and IP address setting to configure network.
8. To connect a multiple hard disk drive in a computer and then create a multiple volume.
9. Troubleshoot system using Disk Defragmenter, Check Disk and Disk Clean-up, Window restore point.
10. Study the details of editing the registry. Try the commands and observe its use.
11. Install Apache Web server, MongoDB and other software's.

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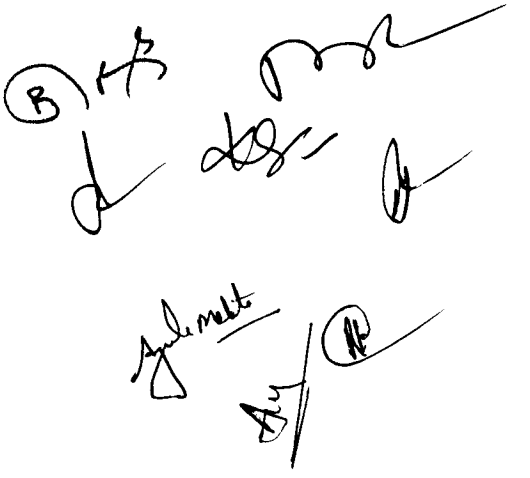

Department of Computer Science and Engineering

COMPUTER NETWORKS
150411 (DC)

Skill-Based Projects

1) Create a patch cord to connect network. Develop a small network to connect 3 systems.
2) Develop an application to simulate PING and TRACEROUTE commands.
3) Simulate Sliding window protocol using socket programming.
4) Simulate Stop and Wait protocol using socket programming.
5) Create chat application using socket Programming.
6) Develop a utility for cyclic redundancy check.
7) Develop a project for Hamming codes.
8) Develop application to produce even/odd parity for given input.
9) Develop a GUI application to find out shortest path using Dijkstra's Algorithm .
10) Develop application to find out shortest path using Floyd–Warshall Algorithm.

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DATABASE MANAGEMENT SYSTEM
150412 (DC)

Skill-Based Projects

1. Develop a project for Library book management database.
2. Develop a project for Hostel seat booking system database
3. Develop a project for Learning management system
4. Develop a project for Restaurant management system database
5. Develop a project for Employee referral system database
6. Develop a project for I-card generation system database
7. Develop a project for Certificate Management System Database
8. Develop a project for Electric Bill System Database
9. Develop a project for Course management system database
10. Develop a project for Client Management System Database
11. Develop a project for Hotel Management System Database

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Department of Computer Science and Engineering

PROGRAMMING LAB.
150415(DLC)
Python Programming

Skill Based Project

1. Develop Tic-Tac-Toe Game.
2. Develop Countdown Clock and Timer application.
3. Develop a Scientific digital calculator.
4. Develop music player.
5. Develop an application for Random password generator.
6. Develop an application for Sending emails.
7. Develop Keylogger application.
8. Develop Web Crawler application.
9. Visualize the Publicly available real world data set using various function and identify the suitable plot for better representation.
10. Handle the missing data and categorical value in a real world Data Set.
11. Build a prediction model based on Classification Data Set.
12. Build a prediction model based on Regression Data Set.
13. Build a prediction model based on Clustering Data Set.

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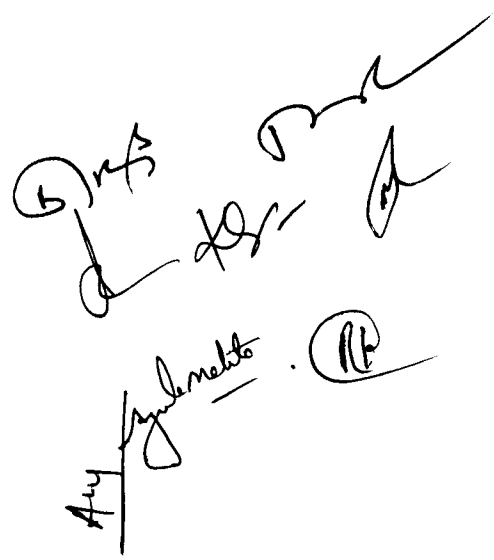

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Department of Computer Science and Engineering

Basic Computer Engineering
100023

List of Skill Based Mini-projects for Basic Computer Engineering

1. Develop a project in C/C++ to implement Tic tac toe game
2. Develop a project in C/C++ to implement basic operation of Leave Management System
3. Develop a project for report card system using C/C++.
4. Develop a project in C/C++ which can generate a Calendar for any year.
5. Develop a project in C/C++ which demonstrates the operations performed by an ATM Machine.
6. Develop a project in C/C++ to create a Number System Conversion system.
7. Develop a project in C/C++ to implement basic operation of Department Store Management System
8. Develop a project in C/C++ to implement basic operation of Library Management System
9. Develop a project in C/C++ to implement basic operation of Bus Reservation System
10. Develop a project in C/C++ to implement Periodic Table.
11. Develop a project in C/C++ to implement Digital clock

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