

(DMCS01)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

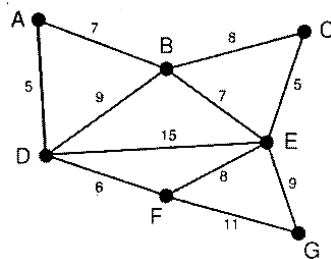
Computer Science

DATA STRUCTURES

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. What is double linked list? Describe different operations on double linked list. Write an algorithm to insert a node at start and middle of the doubly linked list.
2. What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers: 45, 32, 90, 21, 78, 65, 87, 132, 90, 96, 41, 74, 92.
3. Sort the following list using Heap Sort technique, displaying each step. 20, 12, 25, 6, 10, 15, 13.
4. Explain about various Hash collision resolution techniques with examples.
5. Find Minimum Spanning Tree for the given graph using Prim's Algorithm (initialization from node A)



6. Briefly explain various linear and non-linear data structures along with their applications.
7. Write recursive procedure to find a factorial of given number using stack.
8. Write about array and linked list representation of binary tree.
9. Construct binary tree using In - order and Post - order traversal of node given below
In-order : D B F E G H I A C
Pre-order : A B D E F G H I C
10. Write about B – tree indexing.

(DMCS01)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

DATA STRUCTURES

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Consider the following specifications of graph
 $G.V(G) = \{1, 2, 3, 4\}$ and $E(G) = \{(1, 2), (1, 3), (3, 3), (3, 4), (4, 1), (2, 4)\}$.
 - (a) Draw adjacency matrix
 - (b) Adjacency list representation.
2. Describe L-L and R-L rotation in AVL trees with example.
3. Write about Euler's and Hamiltonian circuits.
4. How to represent dynamic array?
5. Define priority queue.
6. What are the elementary graph operations?
7. Define hash table.
8. Differentiate linear search and binary search.

(DMCS02)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

OBJECT ORIENTED PROGRAMMING

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. (a) What is a Stream? What are the stream classes in C++?
(b) Differentiate between C and C++ programs? Illustrate with sample programs.
2. What is function overloading? Write a C++ program to find the area of a circle, rectangle and triangle using function, overloading.
3. What is inheritance? What are different types of inheritance? Explain with example.
4. (a) What is a virtual base class? Why it is important to make a class virtual?
(b) What are the rules for Virtual functions?
5. (a) What is a file mode? Describe the various file mode options available.
(b) Write a function template for finding the minimum value contained in an array.
6. How do variable declare and initialization performed in C++?
7. Write a C++ Program to reverse of an integer.
8. What are the rules for the Inline functions?
9. What is parameterized Constructor? Give one example.

(DMCS02)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

OBJECT ORIENTED PROGRAMMING

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. What is encapsulation? Demonstrate data hiding and encapsulation.
2. Differentiate between static and Dynamic Binding.
3. What are the merits and demerits of Sequential Access Files?
4. Write a program for catching array out of bounds exception.
5. Define polymorphism.
6. Define destructor.
7. Which operators cannot be overloaded?
8. Define Template.
9. Define multiple inheritance.

(DMCS03)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

COMPUTER ORGANIZATION

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. (a) Explain 3 – to – 8-line decoder with diagram and truth table.
(b) Describe working of SR flip-flop with its logic diagram.
2. Explain about IEEE floating point representation and perform addition of two floating numbers.
3. (a) Describe about logical and shift micro operations with suitable applications.
(b) Draw the flowchart for memory reference instructions.
4. Explain the procedure for selection of address for control memory with help of diagram.
5. (a) With a neat sketch explain the working principle of DMA.
(b) Explain about Input-output interface with an example.
6. Perform the following Using BCD arithmetic $(7129)_{10} + (7711)_{10}$
7. What is the function of shift register? With the help of simple diagram explain its working.
8. Brief the three state bus buffers with neat sketch.
9. Differentiate between Synchronous and Asynchronous modes of data transfer.

(DMCS03)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

COMPUTER ORGANIZATION

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. What is one address, two address and three address instruction formats?
2. What is priority interrupt? Discuss about daisy chaining priority interrupt.
3. Describe multiplication algorithm.
4. What is Cache memory? Mention its advantages?
5. What is a prime implicate?
6. Define de-multiplexer.
7. What is the operation of D flip-flop?
8. What is asynchronous serial transfer?
9. What is address space and memory space?

(DMCS04)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

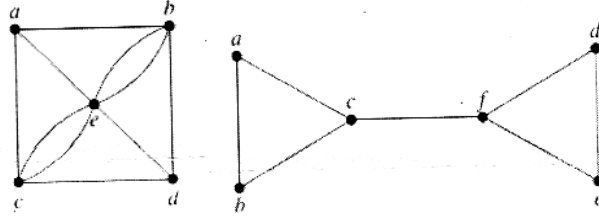
Computer Science

DISCRETE MATHEMATICAL STRUCTURES

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. (a) Provide a proof by contradiction for the following: “for every integer n , if n^2 is odd then n is odd”.
- (b) Show that the expression : $(p \rightarrow r) \vee (q \rightarrow r)$ and $(p \wedge q) \rightarrow r$ is logically equivalent.
2. (a) Show that $R \rightarrow S$ can be drawn from the premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$ and Q .
- (b) Let $A = \{1, 2, 3, 4\}$ and relation $R = \{(1, 2), (2, 1), (2, 3), (3, 4), (4, 4)\}$. Find matrix pf transitive closure of R by using Warshall’s algorithm.
3. (a) If R is a relation on the set $A = \{1, 2, 3, 4\}$ defined by xRy , If x divides y , prove that (A, R) is Poset. Draw its Hasse diagram.
- (b) Let $(L, \leq)$ be a lattice. For any $a, b, c \in L$, if $b \leq c$, prove that $a * b \leq a * c$ and $a \oplus b \leq a \oplus c$.
4. (a) Simplify Boolean expression : $a'b'c + ab'c + a'b'c'$ using Boolean algebra identities.
- (b) Express the Boolean expression $xyz' + y'z + xz'$ in a sum of product form.
5. (a) State and prove Hand shaking theorem. Hence prove that for any simple graph G with n vertices, the number of edges of G is less than or equal to $\frac{n(n-1)}{2}$.
- (b) Determine whether the following graphs have Euler circuit and Hamiltonian circuits. Construct such a circuit when one exists.



6. Find the disjunctive normal of $\neg(p \vee q) \leftrightarrow (p \wedge q)$.

7. Prove that the following argument is valid

$$\begin{array}{l} \forall x[p(x) \rightarrow q(x)] \\ \forall x[q(x) \rightarrow r(x)] \\ \hline \therefore \forall x[p(x) \rightarrow r(x)] \end{array}$$

8. Draw the Hasse diagram for the Poset, $(P(A), \subseteq)$ where $A = \{1, 2, 3, 4\}$ and $P(A)$ is the power set of A .

ASSIGNMENT – 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

DISCRETE MATHEMATICAL STRUCTURES

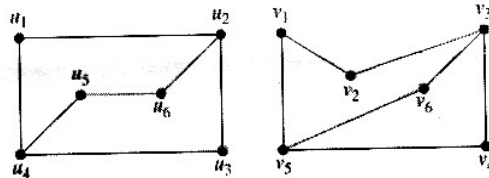
MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Determine whether the relation is reflexive, symmetric, antisymmetric or transitive:

$$A = \{1, 2, 3, 4\}, \quad R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (3, 4), (4, 3), (4, 4)\}.$$

2. Prove that $f^{-1} \circ g^{-1} = (g \circ f)^{-1}$, where $f: Q \rightarrow Q$ such that $f(x) = 2x$ and $g: Q \rightarrow Q$ such that $g(x) = x + 2$ are two functions.
3. Verify the following graphs are isomorphic or not.



4. Find the K-maps for Boolean expression : $x\bar{y} + \bar{x}y + \bar{x}\bar{y}$.
5. Write about Chromatic number with example.
6. Define planar graph.
7. Define homomorphism.
8. Define Conjunctive Normal form.
9. Define Abelian group.
10. Define binary relation.

(DMCS05)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

SOFTWARE ENGINEERING

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Discuss in detail about evolutionary process models.
2. Explain different analysis modelling approaches in requirement engineering.
3. Explain the importance of user interface design in sale of software.
4. Describe black box testing methods and give its advantages and disadvantages.
5. Discuss about metrics for software quality and metrics for small organizations.
6. What are the process patterns and process assessment? Explain.
7. What is Agile process? Write about dynamic system development method.
8. Write about negotiating and validating requirements.
9. What is a cohesion? Write about different types of Cohesion?

(DMCS05)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

SOFTWARE ENGINEERING

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Write short notes on class based components.
2. Describe the golden rules for interface design.
3. What are different levels of testing and the goals of the different levels?
4. What is meant by Unit testing? How unit testing-strategy works on a software module?
5. Define cyclometric complexity.
6. What is regression testing?
7. What is design pattern?
8. What is data dictionary?
9. Define Behavioral Modeling.

(DMCS06)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

DISTRIBUTED OPERATING SYSTEMS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Elaborate the key design issues of Distributed Operating Systems.
2. Explain about the Client Server Model in detail.
3. Explain about the Deadlock in Distributed Systems.
4. Explain about the scheduling in Distributed Systems.
5. Elaborate the NFS architecture and implementation.
6. Discuss about the motivation and goals of typical distributed systems.
7. Explain about the Disadvantages of Distributed Systems.
8. Explain about Election algorithms.
9. Explain about the Group Communication design issues.

(DMCS06)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

DISTRIBUTED OPERATING SYSTEMS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Explain about the Private Workspace and Write ahead Log.
2. Explain about Operation of the up-down algorithm.
3. Name two useful properties that immutable files have.
4. What is the difference between a file service using the upload/download model and one using the remote access model?
5. What is Migration transparency?
6. Compare between connection-oriented and connectionless communication protocol?
7. Explain about the mutual exclusion.
8. What is clock skew?
9. What is processor pool model?

(DMCS07)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

DATABASE MANAGEMENT SYSTEMS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. (a) State and discuss different data models with neat sketches.

 (b) Explain various elements of centralized and client/server architecture for DBMS.
2. Describe various types of attributes present in the ER model. Draw an Entity Relation diagram for the Hospital Management System. Consider the different types of Patients with respect to Disease and In-Patient and Out-Patient department in the design. Consider the availability of all well qualified Doctors. Consider various types of tests and operations to be conducted. Explain the mapping Cardinality used. Assume suitable attributes. Use generalization and Specialization.
3. Write the SQL Queries for the following
 Sailors (Sailor_id, Sailor_name, Rating, Age)
 Reserves (Sailor_id, Boat_id, Day)
 Boats (Boat_id; Boatname, color)
 (a) Find names of sailors who have reserved boat 103.
 (b) Find names of sailors who reserved all red boats.
 (c) Find the colors of boats reserved by the sailor lubber and Gilson.
 (d) Find names of sailors who reserved red and green boats.
 (e) Find names of sailors who reserved red boats.
4. What is meant by normalization? Discuss different types of normal forms.
5. Explain Two Phase Locking protocol. What are its advantages and disadvantages?
6. Describe the limitations of file systems. How to overcome these limitations by DBMS?
7. Write about the terms Primary Key, Candidate Key and Super Key.
8. Explain natural join operation with example
9. Write about B-tree index files.

(DMCS07)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

DATABASE MANAGEMENT SYSTEMS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. What are the differences between relational calculus and tuple calculus?
2. Describe the informal guidelines for relation schemas.
3. State and explain about transaction properties.
4. Write about database recovery mechanism.
5. Define Weak entity.
6. Define nested query.
7. Define static hashing.
8. Define functional dependency.
9. Define serializability.

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

Computer Science

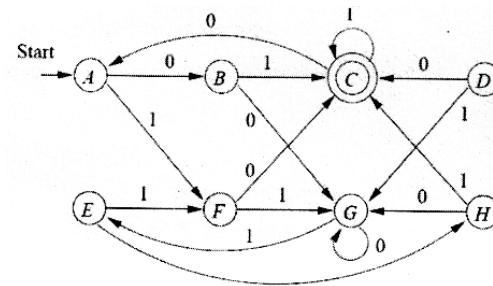
First Year

THEORY OF AUTOMATA AND FORMAL
LANGUAGES

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Construct Minimized DFA for the following DFA using table filling method



2. (a) Obtain DFA from the following

NFA: $M = (\{p, q, r, s\}, \{0, 1\}, \delta, p, \{q, s\})$

Present State Next state

	a	b
p	{q, s}	{q}
q	{r}	{q, r}
r	{s}	{p}
s	—	{p}

- (b) Construct Moore machine that computes residue mod 3 over the binary numbers.
3. (a) Draw FA for each of the following

RE: $(0+1)^*(11+00)(0+1)^*$

- (b) Show that regular language is closed under Union, Kleene star, concatenation, Intersection, complement.

4. (a) Convert the following CFG into CNF grammar: $S \rightarrow \sim S \mid [S \supset S] \mid p \mid q$.
- (b) Construct PDA for the language $L = \{a^n b^m c^{m+n} \mid n, m \geq 0\}$.
5. Define Turing machine for the language $L = \{a^n b^n c^n \mid n \geq 1\}$.
6. Construct OFA for the language $L = \{w : |w| \bmod 3 \neq 0, w \in \{a, b\}^*\}$.
7. Verify the following machines $M_1 = (\{A, B, C, D\}, \{0, 1\}, \delta_1, A, \{B, D\})$ and $M_2 = (\{P, Q, R\}, \{0, 1\}, \delta_2, P, \{R\})$ equivalent or not.

PS Next State			PS Next State		
	0	1		0	1
$\rightarrow A$	B	D	$\rightarrow P$	R	R
B	A	C	Q	R	P
C	D	B	R	P	Q
D	C	A			

8. Prove that $(1+00^*1)+(1+00^*1)(0+10^*1)^*(0+10^*1)=0^*1(0+10^*1)^*$
9. Show that $L = \{a^n b^n \mid n \geq 1\}$ is not regular.

(DMCS08)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

Computer Science

First Year

THEORY OF AUTOMATA AND FORMAL
LANGUAGES

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Show that $S \rightarrow SS \mid aSa \mid bSb \mid \varepsilon$ is ambiguous.
2. What is parsing? Describe different types of parsing techniques.
3. Write about Universal Turing Machine.
4. Explain about Church's hypothesis.
5. Define NFA.
6. What is linear bounded Automata?
7. Define Unit Production.
8. What is PDA?
9. Define decidability.

(DMCS09)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

COMPUTER NETWORKS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Discuss different types of guided and unguided media used to transmit data in network.
2. (a) Differentiate static, dynamic and active documents used in World Wide Web.
(b) Write about the HTTP Operational Model.
3. Describe in detail about TCP segment header and connection Establishment.
4. With a suitable example explain Distance Vector Routing algorithm. What is the serious drawback of Distance Vector Routing algorithm?
5. (a) Explain in detail about the point-to-point protocol frame format.
(b) What is cyclic redundancy check? Show the calculation polynomial code checksum for a frame 1101011011 using the generator $x^4 + x + 1$.
6. Explain about Transport layer multiplexing and de-multiplexing.
7. Explain how the routing mechanism works in internet.
8. Explain Ethernet Frame structure.
9. Describe network layer design issues.

(DMCS09)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

First Year

Computer Science

COMPUTER NETWORKS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Differentiate the process of error correction and error detection in block coding.
2. What is DNS? How resource records are maintained in DNS?
3. Describe the services provided by PPP protocol.
4. How to route the packets in virtual circuit subnets?
5. Define flooding.
6. Define Ten-Gigabit Ethernet.
7. What is channelization?
8. Define frame relay.
9. What is ALOHA?

(DMCS10)

ASSIGNMENT - 1

M.Sc. DEGREE EXAMINATION, MARCH 2023

Computer Science

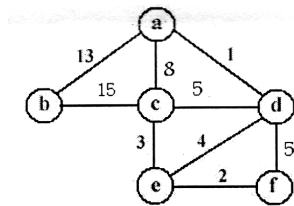
First Year

DESIGN AND ANALYSIS OF ALGORITHMS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Explain all asymptotic notations used in algorithm analysis.
2. Show the result of running Merge sort technique on the sequence 38, 27, 43, 3, 9, 82, 10 and analyze its time complexity.
3. (a) Given the characters $S = \langle a, b, c, d, e, f \rangle$ with the following probability $P = \langle 0.29, 0.25, 0.20, 0.12, 0.05, 0.09 \rangle$, Build a binary tree using greedy Huffman algorithm.
(b) Construct minimum spanning tree from the following graph using Prim's algorithm (Start at vertex a)



4. Find out the number of scalar multiplications needed to multiply the following chain of matrices using dynamic programming.
$$A_1 (5 \times 50) \times A_2 (50 \times 10) \times A_3 (10 \times 20) \times A_4 (20 \times 10)$$
5. State n – queen's problem? Give the solution of 8 – queens problems by backtracking.
6. What is meant by best – case, worst – case and average case time complexities of an Algorithm?
7. Describe connected and Bi – connected components.
8. What is pseudo code? Explain with suitable example.
9. Give the equations for perform Strassen's matrix multiplication.

(DMCS10)

ASSIGNMENT - 2

M.Sc. DEGREE EXAMINATION, MARCH 2023

Computer Science

First Year

DESIGN AND ANALYSIS OF ALGORITHMS

MAXIMUM : 30 MARKS

ANSWER ALL QUESTIONS

1. Find the subset from the given sum using back tracking : $S = \{1, 2, 5, 7\}$ and $d = 8$.
2. Solve the all-pair shortest path problems for given adjacent matrix graph using Floyd's Algorithm.

0	4	8	∞
∞	0	5	12
∞	∞	0	7
5	∞	∞	0

3. What are the differences between backtracking and branch and bound solutions?
4. Find optimal solution for 0/1 knapsack problem $(w_1, w_2, w_3, w_4) = (10, 15, 6, 9)$, $(p_1, p_2, p_3, p_4) = (2, 5, 8, 1)$ and $m = 30$.
5. Express the function $f(n) = 5n^3 + 5n^2 + 10n$ in Θ notation.
6. What is meant by exhaustive search?
7. What is best and worst case time complexity of insertion sort?
8. What is basic principle of Divide and Conquer method?
9. Define principle of optimality.