

(DMCS01)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017

First Year
COMPUTER SCIENCE
Data Structures

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** Construct a binary search tree using the following data 10, 7, 14, 6, 8, 12, 15, 4, 5, 9, 18, 16, 11, 13, 6 and specify the output of traversing the constructed tree using Pre-order, In-order and Post-order Tree traversals.
- Q2)** What is a Graph? Explain Shortest path problem using Dijkstra algorithm.
- Q3)** What is a circular linked list? Explain the operations the operation performed on it with the help of an algorithm.
- Q4)** Define Minimal spanning tree. Explain Prim's algorithm with the help of an example.
- Q5)** What is DQUEUE? Write pseudocode for implementing all its operations.
- Q6)** Explain the merge operation on two binary trees.
- Q7)** Define Queue and explain in detail its types.
- Q8)** Write a program to find the factorial of a given number using recursion.
- Q9)** What is a sparse matrix? How is it represented?

(DMCS01)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017

First Year
COMPUTER SCIENCE
Data Structures

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* Explain Topological sorting.
- Q2)* Explain Heap sort with an example.
- Q3)* Explain Hamiltonian circuits.
- Q4)* Explain Quick sort with the help of the following data 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72.
- Q5)* State the collision resolution techniques.
- Q6)* Define a B tree.
- Q7)* Define a Simple Queue.
- Q8)* State the operation on Arrays.
- Q9)* What is Recursion?



(DMCS02)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)

COMPUTER SCIENCE
Object Oriented Programming

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** Explain the concepts of OOP in detail? State the advantages of OOP over Procedure Oriented Programming.
- Q2)** Write a short note on : pointer, memory allocation operator, memory deallocation operator.
- Q3)** Define constructor? Explain different types of constructors.
- Q4)** Explain inheritance and elaborate its types.
- Q5)** What is a template? Explain functions and class templates.
- Q6)** Explain the uses of scope resolution operator.
- Q7)** What is an inline function? State its limitations.
- Q8)** Explain *this* pointer with a program.
- Q9)** Write a program to implement the concept of unary operator overloading.

(DMCS02)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)

COMPUTER SCIENCE
Object Oriented Programming

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* Explain the concept of virtual functions with an example.
- Q2)* Write a program to display the contents of an existing file.
- Q3)* Explain different forms of catch().
- Q4)* Explain the concept of call by value.
- Q5)* Define a stream.
- Q6)* Function prototype.
- Q7)* Virtual class.
- Q8)* Namespaces.
- Q9)* Constructor overloading.



(DMCS03)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Computer Organization
MAXIMUM MARKS:30
Answer ALL Questions

- Q1)* Explain the design procedure of combinational circuits with an example.
- Q2)* Explain the architecture of ALSU.
- Q3)* Explain about micro programmed control unit.
- Q4)* What is complement? Explain about r 's and $r-1$ ' complement.
- Q5)* Explain about Associative memory.
- Q6)* Differentiate Sequential and Combinational circuits.
- Q7)* Explain stack organization.
- Q8)* Explain Asynchronous data transfer.
- Q9)* Explain Cache memory.

(DMCS03)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Computer Organization
MAXIMUM MARKS:30
Answer ALL Questions

- Q1)* Explain the need of error correcting codes in communications.
- Q2)* Explain about BUS and Memory transfer.
- Q3)* Explain about instruction format.
- Q4)* Explain about counters.
- Q5)* What is multiplexer.
- Q6)* What is binary code.
- Q7)* What is register transfer language.
- Q8)* What is r-1's complement.
- Q9)* What is secondary memory.



(DMCS 04)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DECEMBER – 2017

First Year
COMPUTER SCIENCE
Discrete Mathematical Structures

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** a) Show that,
 $(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$.
- b) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)P(x) \vee (\exists x)Q(x)$.
- Q2)** a) Show that, the function $f(x) = \frac{x}{2}$ is a partial recursive function.
- b) Prove that, the minimum weight of the non-zero code word in a group code is equal to its Minimum distance.
- Q3)** a) Let $(L, *, \oplus)$ be a lattice. For any $a, b, c \in L$ the following holds.
 $a \leq c \Leftrightarrow a \oplus (b * c) \leq (a \oplus b) * c$.
- b) Simplify the following Boolean expressions
- i) $(a*b)^1 \oplus (a \oplus b)^1$
- ii) $(a^1 * b^1 * c) \oplus (a * b^1 * c) \oplus (a * b^1 * c^1)$.
- Q4)** a) Prove that, a complete bipartite graph $K_{m,n}$ is planar iff $m \leq 2$ (or) $n \leq 2$.
- b) Prove that, a graph G is 2 Colorable iff G is bipartite.
- Q5)** a) Prove that, a non empty subset S of G is a subgroup of a group $(G, *)$ if and only if for any $a, b \in S$, $a*b^{-1} \in S$.
- b) Prove that, if $(G, *)$ is an abelian group, then for all $a, b \in G$, $(a*b)^n = a^n * b^n$

Q6) Prove $\neg(P \uparrow Q) \Leftrightarrow (\neg P \downarrow \neg Q)$.

Q7) Prove that, every cyclic group is an abelian group.

Q8) Define Primitive recursive function and show that $f(x, y) = x^y$ is a primitive recursive function.

Q9) Prove that in any non-directed graph, sum of the degrees of the vertices is even.

(DMCS 04)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DECEMBER – 2017

First Year
COMPUTER SCIENCE
Discrete Mathematical Structures

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** Let G and H be two groups with respective multiplication. Let $f : G \rightarrow H$ be a on-to homomorphism. Then, prove that Kernal of f is a subgroup of G .
- Q2)** Prove that, every chain is a distributive lattice.
- Q3)** State and prove De Morgan's laws in Boolean algebra.
- Q4)** Prove that, in a distributive lattice every element has a unique complement.
- Q5)** Define regular function with example.
- Q6)** Define Transitive closure of a relation.
- Q7)** Define Boolean algebra.
- Q8)** Show that, in a lattice L for any $a, b \in L$, $a * b = a$ iff $a \oplus b = b$.
- Q9)** Define Bipartite Graph.

(DMCS05)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Software Engineering
MAXIMUM MARKS:30
Answer ALL Questions

- Q1)* Explain RAD and Spiral Process models.
- Q2)* Discuss about various design engineering concepts in detail.
- Q3)* Discuss about software reviews and formal technical reviews in connection with SQA.
- Q4)* What is a metric? Discuss about process and product metrics.
- Q5)* Describe the architectural design metrics and MOOD metrics suit for design model.
- Q6)* Explain the pros and cons of Personal and Team process models.
- Q7)* Explain Coupling and Cohesion.
- Q8)* Develop different levels of DFD for safe home security function.
- Q9)* Explain system engineering hierarchy.

(DMCS05)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Software Engineering
MAXIMUM MARKS:30
Answer ALL Questions

- Q1)* What are architectural styles and patterns? Explain.
- Q2)* Stt the golden rules of User Interface Design.
- Q3)* Explain Scenario-based testing.
- Q4)* Discuss about formal Technical Reviews.
- Q5)* What is verification?
- Q6)* What is validation?
- Q7)* What is a metric?
- Q8)* Define Testing.
- Q9)* What is a review?



(DMCS06)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017

First Year
COMPUTER SCIENCE
Distributed Operating Systems

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* Explain in detail protocol layers and transfer mode networks.
- Q2)* Discuss about algorithms for implementing share memory in Distributed system.
- Q3)* Discuss about process synchronization in Distributed system.
- Q4)* Discuss about scheduling in Distributed system.
- Q5)* Write a short note on RAID and kernel module with respect to a distributed system.
- Q6)* Define distributed system and state its types.
- Q7)* What is a Thread? How is it different from process?
- Q8)* Explain Remote procedure call.
- Q9)* Discuss about election algorithm.

(DMCS06)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017

First Year
COMPUTER SCIENCE
Distributed Operating Systems

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* Write a note on real time scheduling.
- Q2)* Explain file allocation methods.
- Q3)* What are logical clocks? Explain.
- Q4)* Differentiate between nested and distributed transaction.
- Q5)* What is fault tolerance.
- Q6)* Define protocol.
- Q7)* What is atomic transaction?
- Q8)* What is server interface?
- Q9)* Explain processor pool?



(DMCS 07)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DECEMBER – 2017

First Year
COMPUTER SCIENCE
Database Management Systems

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* How are database users classified? Explain the functions of DBA.
- Q2)* What is an SQL? Explain DDL and DML commands in SQL.
- Q3)* Define Normalization. Explain any 1NF, 2NF and BCNF.
- Q4)* Explain the process of handling Deadlocks by DBMS.
- Q5)* Write a short note on Queries, sub queries and nested queries.
- Q6)* What is a view? How is it different from a table?
- Q7)* Draw the symbols used to construct ER diagram and also state their purpose.
- Q8)* Explain CREATE command of SQL completely.
- Q9)* What is Embedded SQL? Explain.

(DMCS 07)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DECEMBER – 2017

First Year
COMPUTER SCIENCE
Database Management Systems

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* Explain functional dependency? State its types.
- Q2)* Explain B-Tree index files.
- Q3)* State the pros and cons of static hashing.
- Q4)* Explain domain constraints used in SQL.
- Q5)* What is a candidate key?
- Q6)* Define Entity.
- Q7)* What is atomicity?
- Q8)* What is a Trigger?
- Q9)* What is a view?



(DMCS08)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Theory of Automata and Formal Languages

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** Prove that if r be a regular expression, then there exists an NFA with epsilon transitions that accepts $L(r)$?
- Q2)** Explain the decision algorithms for regular sets?
- Q3)** State and prove three closure properties of Context Free Language?
- Q4)** Prove the un-decidability of post correspondence problem?
- Q5)** Draw a transition diagram for a Turing machine accepting the following language?
 $\{a^n b^n c^n \mid n > 0\}$
- Q6)** State and prove the pumping lemma for regular sets? Show that $L = \{ww \mid w \text{ belongs to } \{a,b\}^*\}$ is not regular.
- Q7)** Prove the language $L = \{0^n 1^n 2^n \mid n \geq 1\}$ is not a CFL?
- Q8)** Construct a Finite Automata for the regular expression $(a+b)^* ab$?
- Q9)** Prove the following statements.
a) If L is regular then LT is also regular.
b) If L is regular set over Σ , then Σ^*L is also regular over Σ .

(DMCS08)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)

COMPUTER SCIENCE

Theory of Automata and Formal Languages

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)* Construct a PDA accepting the language of palindromes over the alphabet {a,b}?
- Q2)* Prove the equivalence of acceptance by final state and empty stack in PDA?
- Q3)* Explain universal Turing machine?
- Q4)* Explain Chomsky hierarchy?
- Q5)* Define regular grammar?
- Q6)* Define deterministic push down automata?
- Q7)* Define context sensitive language?
- Q8)* Define ambiguity in CFL?
- Q9)* Define Chomsky normal form?



(DMCS09)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Computer Networks
MAXIMUM MARKS:30
Answer ALL Questions

- Q1)* Explain in detail TCP/IP reference model with neat diagram.
- Q2)* What is Cryptography? Explain Symmetric and Asymmetric Key Cryptography.
- Q3)* Explain Routing Principles and Routing in the Internet.
- Q4)* What is switching? Explain its types in detail.
- Q5)* Explain the concept of Multiple Access Protocols in detail.
- Q6)* Write about the Error Correction Techniques.
- Q7)* Explain the applications of Networking.
- Q8)* Explain about Naming Techniques.
- Q9)* Write about different topologies.

(DMCS09)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Computer Networks
MAXIMUM MARKS:30
Answer ALL Questions

- Q1)* Compare the guided and unguided transmission media.
- Q2)* Write about DES algorithm.
- Q3)* Write about Hierarchical Routing.
- Q4)* Write about IP address calculation.
- Q5)* E-Mail.
- Q6)* What is Internet.
- Q7)* Define Hub and Switches.
- Q8)* What is Multiplexing.
- Q9)* What is routing.



(DMCS10)

ASSIGNMENT-1
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Design & Analysis of Algorithms

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** Read the sequence of integers as input, terminated by -1? Write an algorithm to find the second largest element? [NO use of arrays]
- Q2)** Explain the behavior of union and weighted union with an algorithm?
- Q3)** Explain prims algorithm for the construction of minimum cost spanning trees on a example graph? Write the prims algorithm
- Q4)** Solve the N-queen's problems with an algorithm and calculate its complexity?
- Q5)** Explain FIFO branch and bound technique 15-puzzle problem?
- Q6)** Show that the following equalities are correct?
- a) $5n^2 - 6n = \theta(n^2)$
 - b) $6 \cdot 2^n + n^2 = O(2^n)$
 - c) $10n^2 + 4n + 2 = \Omega(n^2)$
- Q7)** Explain the merge sort sorting procedure with an algorithm and calculate its best and worst case time complexity?
- Q8)** Explain single source shortest path problem with an example graph?
- Q9)** Explain Kruskals algorithm for the construction of minimum cost spanning trees on a example graph? Write the Kruskals algorithm?

(DMCS10)

ASSIGNMENT-2
M.Sc. DEGREE EXAMINATION, DEC. – 2017
(First Year)
COMPUTER SCIENCE
Design & Analysis of Algorithms

MAXIMUM MARKS:30

Answer ALL Questions

- Q1)** Use function OBST to compute $w(i,j)$, $r(i,j)$ and $c(i,j)$, $0 \leq i < j \leq 4$ for the identifier set $(a_1, a_2, a_3, a_4) = (\text{cout, float, if, while})$ with $p(1) = 1/20$, $p(2) = 1/5$, $p(3) = 1/10$ and $p(4) = 1/20$, $q(0) = 1/5$, $q(1) = 1/10$, $q(2) = 1/5$, $q(3) = 1/20$ and $q(4) = 1/20$ using the $r(i,j)$'s construct the optimal binary search tree?
- Q2)** Let $w = \{5, 7, 10, 12, 15, 18, 20\}$ and $m = 35$. Find all possible subsets of w that sum to m using sub of subsets?
- Q3)** Explain Hamiltonian cycle problem on a graph with an algorithm?
- Q4)** Solve TSP problem using FIFO-branch and bound technique.
- $$\begin{pmatrix} \alpha & 20 & 30 & 10 & 11 \\ 15 & \alpha & 16 & 4 & 2 \\ 3 & 5 & \alpha & 2 & 4 \\ 19 & 6 & 18 & \alpha & 3 \\ 16 & 4 & 7 & 16 & \alpha \end{pmatrix}$$
- Q5)** Define Big Oh and Theta Asymptotic notation?
- Q6)** Write the iterative algorithm for binary search?
- Q7)** Explain control abstraction of greedy method?
- Q8)** Explain the principle of optimality in dynamic programming?
- Q9)** Define branch and bound algorithm design method?
