

ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- I : DATA STRUCTURES

Maximum : 30 MARKS

Answer ALL questions.

- 1)** What is single linked list? Explain its operations in detail.
 - 2)** a) Discuss about the representation of stacks.

b) Explain the operations on stacks.
 - 3)** Explain about the binary tree traversals in detail with neat diagram.
 - 4)** Explain the concept & overview of data structures.
 - 5)** Discuss about the applications of Queues.
 - 6)** Write about merging of 2 binary trees.
 - 7)** Write a short notes on representation of trees.
 - 8)** What is a Queue?
 - 9)** Define Binary tree.
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ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- I : DATA STRUCTURES

Maximum : 30 MARKS

Answer ALL questions.

- 1)** Write a c++ program to perform heap sort.
 - 2)** Explain about shortest path problem with neat illustration.
 - 3)** Apply Heap sort algorithm on the following elements; 68, 41, 72, 54, 78, 89, 21, 93, 15.
 - 4)** Write about Bucket sort.
 - 5)** Discuss about Euler's & Hamiltonion circuits.
 - 6)** Write a short notes on topological sorting.
 - 7)** What is expression tree?
 - 8)** Define B-Tree.
 - 9)** What is a graph?
-

ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- II : OBJECT ORIENTED PROGRAMMING

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain about call by value, call by address and call by reference with example in C++.
 - 2) What is string handling function? Explain different types of string handling Functions in C++.
 - 3) What is a constructor? Explain different types of constructors.
 - 4) Discuss about the structure of C++.
 - 5) Discuss about loops in C++.
 - 6) What are data abstraction and encapsulation.
 - 7) Describe about pointers.
 - 8) What is a keyword?
 - 9) Define friend function.
-

ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- II : OBJECT ORIENTED PROGRAMMING

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) Describe about virtual functions in detail.
b) Write a C++ program illustrating –virtual functions.
 - 2) Explain exception handling in detail with an example program using C++.
 - 3) What is operator overloading? Explain.
 - 4) Explain about static & dynamic binding.
 - 5) Discuss about C++ input output streams.
 - 6) Write about the concept of files in C++.
 - 7) What is a template?
 - 8) What is file.
 - 9) Define by, catch, block statements.
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ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- III : COMPUTER ORGANIZATION

Maximum : 30 MARKS

Answer ALL questions.

- 1) What is a flip-flop? Explain different types of flip flops.
 - 2) Differences between sequential versus combination circuits.
 - 3) What is a multiplexer and demultiplexer? Explain with its truth tables.
 - 4) Write a note on logic gates.
 - 5) What is a decoder and encoder.
 - 6) Write a note on register transfer notation.
 - 7) Write about the instruction cycle.
 - 8) Differentiate between computer organization & architecture.
 - 9) Define a register.
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ASSIGNMENT - 2, DEC - 2018.

**M.Sc. (PREVIOUS) FIRST YEAR DEGREE
COMPUTER SCIENCE**

PAPER- III : COMPUTER ORGANIZATION

Maximum : 30 MARKS

Answer ALL questions.

- 1)** What is a register? Explain different registers in detail.
 - 2)** What is a cache memory? Explain about its organization and its mapping concepts.
 - 3)** Explain about stack organization.
 - 4)** Write a note on addressing mode.
 - 5)** What is a floating point arithmetic operations.
 - 6)** Write about primary memory? List out different types.
 - 7)** What is a counter.
 - 8)** What is an Interrupt.
 - 9)** Define synchronous data transfer.
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ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- IV : DISCRETE MATHEMATICAL STRUCTURES

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) Show that $S \vee R$ is tautologically implied by $(P \wedge Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$.
b) State all the rules of logical inference.
 - 2) a) Show that $R \vee S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$ and $\neg R$, P , and Q .
b) Let $f(x) = \sin x$, $g(x) = x^2 + 4$ and $h(x) = 5x$ for $x \in \mathbb{R}$ where \mathbb{R} is the set of all real numbers find $f \circ g$, $g \circ f$, $f \circ h$, $h \circ f$, $g \circ h$ and $h \circ g$.
 - 3) a) Define the properties of binary relations.
b) Prove that every equivalence relation on a set generates a unique partition of the set. The blocks of this partition correspond to the R -equivalence classes.
 - 4) Construct the truth table for $[(P \vee Q) \wedge (\neg R)] \leftrightarrow (Q \rightarrow R)$.
 - 5) Show that $(\neg R \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \leftrightarrow R$.
 - 6) Let A be a set. Define $p(A)$, the power set of A , find $P(A)$ when $A = \{1, 2, 3\}$.
 - 7) Show that $\neg(P \wedge Q)$ follows from $\neg P \vee \neg Q$.
 - 8) Define the connective disjunction.
 - 9) Define poset.
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ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- IV : DISCRETE MATHEMATICAL STRUCTURES

Maximum : 30 MARKS

Answer ALL questions.

1) a) Let (S, \cdot) be a given semigroup. Then prove that there exists homomorphism $g: S \rightarrow S^S$, where (S^S, \circ) is a semigroup of functions from S to S under the operation of (left) composition.

b) Let (L, \leq) be a lattice. For any $a, b, c \in L$, prove that the following inequalities, called the distributive inequalities hold:

$$a \oplus (b * c) \leq (a \oplus b) * (a \oplus c)$$

$$a * (b \oplus c) \geq (a * b) \oplus (a * c).$$

2) a) Prove that in a graph G , every u - v path contains a simple u - v path.

b) If G is a connected plane graph, then prove that $|V| - |E| + |R| = 2$.

3) Let $f(x) = x + 2$, $g(x) = x - 2$, and $h(x) = 3x$ for $x \in R$, where R is the set of real numbers. Find $g \circ f$, $f \circ g$ and $f \circ h$.

4) Define lattice and write four properties of lattices.

5) Show that in any nondirected graph there is an even number of vertices of odd degree.

6) Define bipartite graph and complete graph.

7) Define monoid.

8) Define simple graph.

9) Define degree of a vertex in a graph G .

ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- V : SOFTWARE ENGINEERING

Maximum : 30 MARKS

Answer ALL questions.

- 1) Generate a view of software engineering & give the importance of software project planning & software estimation models.
 - 2) a) Explain about software quality assurance.

b) List & explain automated tools for software estimation & project scheduling.
 - 3) Describe
 - a) Software modular design principles.
 - b) Features & principles of software analysis & functional modelling.
 - 4) Describe the evolving role of software.
 - 5) Explain about software estimation models.
 - 6) Describe any two software life cycle models.
 - 7) Describe risk analysis in software design.
 - 8) Define function point metrics.
 - 9) What is transaction?
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ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- V : SOFTWARE ENGINEERING

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain the management of object oriented software project & about software component based development.
 - 2) Explain software testing strategies & techniques.
 - 3) Differentiate program and a software product & define with ex.
 - 4) Explain the methods of system testing.
 - 5) What are the decomposition techniques used?
 - 6) Give the objectives of integration testing.
 - 7) Define software.
 - 8) Differentiate white box & black box.
 - 9) What is quality management?
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ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- VI : DISTRIBUTED OPERATING SYSTEM

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain in detail communication in distributed systems.
 - 2) a) Explain about Atomic transaction in detail.

b) Discuss about sender inherited algorithm.
 - 3) a) Discuss any four scheduling algorithm in detail.

b) Explain the classification of agreement problems.
 - 4) Discuss about RPC mechanism in detail.
 - 5) Explain layered protocols in detail.
 - 6) Discuss solutions to distributed mutual exclusion.
 - 7) Discuss any two deadlock detection algorithm.
 - 8) Define distributed system.
 - 9) What is context switch?
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ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- VI : DISTRIBUTED OPERATING SYSTEM

Maximum : 30 MARKS

Answer ALL questions.

- 1)** Explain about design issues and implementation of distributed file system.
 - 2)** a) Explain commit & non-blocking commit protocols.

b) Discuss distributed shared memory in detail.
 - 3)** Explain about system models in detail.
 - 4)** What is concurrent atomic transaction? Explain in detail.
 - 5)** Explain the classification of failures.
 - 6)** What is shared memory in distributed system?
 - 7)** What is trap?
 - 8)** Define Cache memory.
 - 9)** What type of threat encountered in computer?
-

ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- VII : DATA BASE MANAGEMENT SYSTEMS

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain the basic concepts of Entity Relational Data Model & discuss advantages & disadvantages.
 - 2) Explain:
 - a) Relational constraints with examples.
 - b) Tuple relational calculus.
 - 3) Discuss the structure of SQL queries & aggregate functions in SQL & explain integrity constraints.
 - 4) Discuss the applications of database.
 - 5) Explain in detail schemas & instances.
 - 6) Explain the features of Dynamic SQL.
 - 7) What is Boyce –Codd normal form? Explain.
 - 8) Define database Management system.
 - 9) What is Query?
-

ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- VII : DATA BASE MANAGEMENT SYSTEMS

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain in detail about Indexing and Hashing with example.
 - 2) Discuss in detail:
 - a) Transaction concept
 - b) Handling of deadlock.
 - 3) Explain about triggers & OQL.
 - 4) Discuss about B⁺ tree & B⁻ tree index files.
 - 5) Generate serializability in detail.
 - 6) What is aggregation? Explain with example.
 - 7) Define relational algebra.
 - 8) What is encryption?
 - 9) Define class diagram.
-

ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- VIII : THEORY OF AUTOMATA AND FORMAL LANGUAGE

Maximum : 30 MARKS

Answer ALL questions.

- 1) State and prove the complement of DCFL is a DCFL.
 - 2) Discuss about finite automation model.
 - 3) Explain about regular expression & its manipulations.
 - 4) Write about finite state machine.
 - 5) Write about the conversion of NFA to DFA.
 - 6) Discuss about closure properties of regular sets.
 - 7) Write about pumping lemma.
 - 8) Define language.
 - 9) What is regular grammar?
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ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- VIII : THEORY OF AUTOMATA AND FORMAL LANGUAGE

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain linear bounded automata and content sensitive language.
 - 2) State and prove myhill – Neroda theorem.
 - 3) Explain derivation trees.
 - 4) Discuss about context free grammar.
 - 5) Write about Church's hypothesis.
 - 6) Write a short notes on universal turning machine.
 - 7) Define PDA.
 - 8) What is CFL?
 - 9) Define DCFL.
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ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- IX : COMPUTER NETWORKS

Maximum : 30 MARKS

Answer ALL questions.

- 1) Explain about OSI model in detail.
 - 2) Explain about the application layer protocols principles.
 - 3) Explain about multiplexing and demultiplexing applications.
 - 4) Write a note on Internet and Internetworking.
 - 5) Write about the delay in packet switched networks.
 - 6) What is HTTP, FTP, e-mail in internet.
 - 7) What are the services of transport layer.
 - 8) What is a protocol
 - 9) WWW
-

ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- IX : COMPUTER NETWORKS

Maximum : 30 MARKS

Answer ALL questions.

- 1)** Explain about the UDP in detail.
 - 2)** Explain about the LAN address and ARP in detail.
 - 3)** What are the principles of reliable data transfer.
 - 4)** Write a note on TCP/IP.
 - 5)** Write about the network service models in detail.
 - 6)** What is error detection & correction.
 - 7)** Define ISP
 - 8)** IPV6
 - 9)** Define PPP
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ASSIGNMENT - 1, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

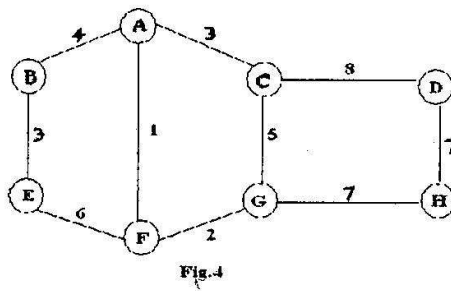
COMPUTER SCIENCE

PAPER- X : DESIGN & ANALYSIS OF ALGORITHMS

Maximum : 30 MARKS

Answer ALL questions.

- 1) What is difference between time and space complexity. Also describe asymptotic notations used for describing the complexity.
- 2) Write the linear search algorithm and analyze for its best, worst and average case time complexities.
- 3) Using Dijkstra's algorithm finds the shortest path between node A and all the remaining nodes in the following graph.



- 4) Solve the recurrence relation $T(n) = 4.T(n/2) + n$, and draw all the intermediate steps.
 - 5) Sort the following elements using selection sort 90, 20, 10, 30, 70.
 - 6) Explain strassen's matrix multiplication.
 - 7) Explain elaborately recursive backtracking algorithm.
 - 8) What is level order traversal? Give example?
 - 9) Define max heap and min heap with tree representation?
-

ASSIGNMENT - 2, DEC - 2018.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

COMPUTER SCIENCE

PAPER- X : DESIGN & ANALYSIS OF ALGORITHMS

Maximum : 30 MARKS

Answer ALL questions.

- 1) With an example explain BFS and DFS Search and Traversal techniques.
 - 2) Find optimal solution to the knapsack instance $n=7$, $m=15$, $(p_1, p_2, p_3, \dots, p_7) = (10, 5, 15, 7, 6, 18, 3)$ and weights $(w_1, w_2, w_3, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$
 - 3) Draw the relationship between P, NP, and NP-Hard problems.
 - 4) Define omega notations with an example.
 - 5) Explain prim's algorithm with proper example.
 - 6) Write the general characteristics of greedy algorithm.
 - 7) What is called substitution method?
 - 8) What is a biconnected graph?
 - 9) Define clique problem?
-