

AH – 1544 CV-19
M.A./M.Sc. (Previous)
Term End Examination 2019-20
Mathematics
Paper-V

Time : Three Hours]

[Maximum Marks : 100

[Minimum Pass Marks : 36

Note : Answer any five questions. Answer to each question should begin on a fresh page. All question carry equal marks.

1. (A) Define and explain each of the following
 - (i) Conjunction
 - (ii) Disjunction
 - (iii) Conditional and bi-conditional statement
 - (iv) Tautology
 - (v) Universal quantifier(B) Explain five rules of inference with suitable examples for each rule.
2. (A) Define and explain each of the following
 - (i) Semi-group
 - (ii) Monoid
 - (iii) Group
 - (iv) Abelian group
 - (v) Cyclic group and subgroup(B) Explain partially ordered set (POSET). Prove that "Set of real numbers under Binary Operation less than or equal to (\leq) is a POSET"
3. (A) Explain different types of lattice with suitable examples for each.
(B) Design a finite state machine having input alphabet = $\{0,1\}$ Which accepts the set of all strings ending in "101".
4. (A) "Dual of complemented lattice is complemented" Prove statement is true or false.
(B) Define with examples " Homomorphism of semi-group and monoid."
5. (A) Define and explain each of the following
 - (i) Canonical disjunctive normal form
 - (ii) Canonical Conjunctive normal form
 - (iii) Sum of product
 - (iv) Product of sum
 - (v) Standard Form

P.T.O.

(B) Express the Boolean function:-

$F=A+B'C$ as standard sum of min-terms

$F=xy+x'z$ as product of max-terms

6. (A) Explain the steps involved in converting infix notation to postfix notation. Apply those steps and find out postfix notation for the following expression:

$$(A-B) * [C/(D+E)+F]$$

(B) Explain Karnaugh map with suitable example.

7. (A) Construct non-deterministic finite automata that accepts all strings ending with 01. Also draw its transition table.

(B) Explain Chomsky classification of grammars with examples.

8. (A) Define each of the following:

(i) Degree of graph

(ii) Path

(iii) Circuit

(iv) Directed graph and undirected graph

(v) Planar graph

(B) State Euler's formula for planar graph. Also give proof for Euler's Formula.

9. (A) Define graph. Explain matrix representation of graph and their adjacency matrix with suitable examples.

(B) Explain the following:

(i) Bipartite graph

(ii) Complete Bipartite graph

(iii) Euler graph

(iv) Euler Path

(v) Eulerian circuit

10. (A) What is minimum spanning tree. Explain any one algorithm to find out minimum spanning tree of a graph with suitable example.

(B) Explain the following:

(i) Tree

(ii) Kuratowski's theorem

(iii) Cut Set

(iv) In-degree and out-degree of graph

(v) Deterministic finite automata

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