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Total No. of Pages : 02

Total No. of Questions : 09

MCA (2015 & Onwards) (Sem.-2)
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
Subject Code : MCA-201
Paper ID : [72876]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTIONS-A, B, C & D contains TWO questions each carrying TEN marks each and students has to attempt any ONE question from each SECTION.
2. SECTION-E is COMPULSORY consisting of TEN questions carrying TWENTY marks in all.

SECTION-A

1.
 - a) Describe multigraph by taking suitable example.
 - b) If a graph G consists of edges $\{(a,b), (a,c), (b,d), (c,d), (b,c)\}$. Find Chromatic number of G .
2.
 - a) What is the application of Eulerian graph in Computer Science?
 - b) State and explain algorithm for finding shortest path from a given graph.

SECTION-B

3.
 - a) If a set $A = \{a, b, c, d\}$, then find the power set $P(A)$.
 - b) Differentiate between Countable and Uncountable sets. Highlight differences by taking suitable examples.
4.
 - a) If relation $R = \{(a,a), (a,b), (b,c); (b,b), (c,d); (d,d)\}$. Check whether R is equivalence relation or not.
 - b) Describe **any five** properties of relations.

SECTION-C

5. a) Explain different connectives used in algebra of logic.
b) What is the application of Principle of mathematical induction?
6. a) Show that $(a+b)' = a'b'$ is a tautology.
b) Differentiate between universal and existential quantifier.

SECTION-D

7. a) Define scalar matrix. What is the significance of unit matrix in Computer Science? Explain.
b) "*Matrix multiplication is not commutative*". Justify the statement.
8. a) Differentiate between Gauss Jordan and Gauss Elimination methods.
b) What is meant by matrix inversion? Explain.

SECTION-E

9. **Write briefly :**
 - a) Define Symmetric relation.
 - b) What is minset?
 - c) List two examples of Hermitian matrix.
 - d) What is meant by "*Closure property*" of a set?
 - e) How rank of a matrix can be calculated?
 - f) List two properties of Hamiltonian graph.
 - g) Define range and domain of a function.
 - h) Show that intersection of disjoint sets is void.
 - i) Define Skew symmetric matrix.
 - j) What are bipartite graphs?