

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**MCA (Sem.-2)**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

Subject Code : MCA-201

M.Code : 72876

Date of Examination : 14-07-22

Time : 3 Hrs.

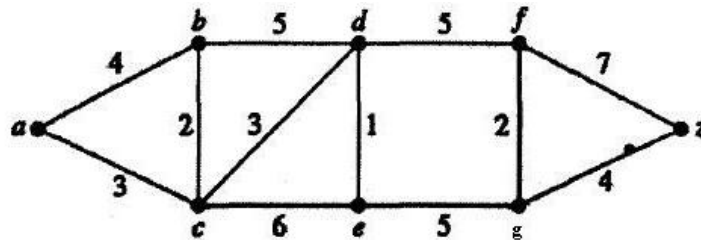
Max. Marks : 60

**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. Differentiate between following :
  - a) Directed and Undirected graphs
  - b) Euler and Hamilton path
2. Apply Dijkstra's algorithm to find shortest path between a and z in the given weighted graph.



**SECTION-B**

3. List and explain various properties of relations on a set with suitable example.
4.
  - a) Show that the set of odd positive integers is a countable set.
  - b) What are die union, intersection, difference, and symmetric difference of the set of positive integers and the set of odd integers?

### SECTION -C

5. Use mathematical induction to show that  
 $1 + 2 + 2^2 + \dots + 2^n = 2^{n+1} - 1$  for all non-negative integers n.
6. List and explain the usage of quantifiers in predicate form of logic.

### SECTION - D

7. Use Gaussian Elimination to solve die following system of equations.
- $$3x + 6y = 11$$
- $$2x + 4y = 9$$
8. Write short notes on:
- Inverse of a matrix
  - Rank of a square matrix

### SECTION - E

9.
  - What is a tautology?
  - What is transpose of a matrix?
  - What are multiple graphs?
  - What do you mean by graph coloring?
  - Define uncountable sets.
  - What is determinant of a matrix?
  - List some applications of graphs.
  - List the connectives used in propositional logic.
  - What is graph of relations?
  - What is Chromatic number?

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**