

2011

Time : 3 hours

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Objective Type Questions)

(Compulsory)

Answer all questions.

1. Choose the correct answer of the following :

$2 \times 10 = 20$

(a) A set consisting of single element is called a :

(i) Null Set

(ii) Equal Set

- (iii) Singleton set
 - (iv) None of the above
- (b) Let A and B be two sets such that if every element of A is in B, then A is said to be a _____ of B.
- (i) Proper subsets
 - (ii) Subsets
 - (iii) Universal sets
 - (iv) None of the above
- (c) Intersection of two sets A and B is the set of elements which are both in A and B. This is denoted by :
- (i) $A \cup B$
 - (ii) $A \subset B$
 - (iii) $A \cap B$
 - (iv) $A - B$
- (d) A matrix in which $m = n$ (where $n =$ rows and $m =$ columns) is called a :
- (i) Null Matrix
 - (ii) Square Matrix

- (iii) Diagonal Matrix
 - (iv) None of the above
- (e) A declarative sentence which is either 'true' or 'false' but not both at the same time is called a _____.
- (i) Proposition
 - (ii) Tautology
 - (iii) Contradiction
 - (iv) None of the above
- (f) The proposition which are constructed by combining two or more simple proposition with the use of certain words is known as :
- (i) Compound propositions
 - (ii) Connectives
 - (iii) Tautologies
 - (iv) Contradiction
- (g) Graph is represented by :
- (i) Dots
 - (ii) Lines
 - (iii) Diagram
 - (iv) Circle

(h) If more than one line is joining two points, the resulting graph is called :

- (i) Multi graph
- (ii) Complete graph
- (iii) Null graph
- (iv) Single graph

(i) In regular graph, every node have :

- (i) 0 degree
- (ii) 1 degree
- (iii) Equal degree
- (iv) None of the above

(j) What is the output of EX-OR gate when input is 0 ?

- (i) 0
- (ii) 1
- (iii) Not defined
- (iv) Both (i) and (ii)

Group – B

(Long-answer Type Questions)

Answer any **four** questions : $15 \times 4 = 60$

2. Solve the following system of equations by matrix inversion method :

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

3. Represent the following by Venn Diagram :

(a) $A - B$

(b) $A \in B$

(c) $(A \cup B) \cap C$

(d) $A \cap B \cap C$

4. Let P and Q stands for the statement $2 + 3 = 5$ and $3 + 7 = 8$ respectively. Describe the following statements :

(a) $P \wedge Q$

(b) $\neg P \wedge Q$

(c) $P \wedge \neg Q$

(d) $\neg P \wedge \neg Q$

(e) $P \vee Q$

5. Write the properties of Relations.
6. Solve the linear equations by using Gauss-Elimination Method :

$$x_1 + x_2 + x_3 = 6$$

$$3x_1 + 3x_2 + 4x_3 = 20$$

$$2x_1 + x_2 + 3x_3 = 13$$

7. Define a Bi-graph or bipartite graph with example.
8. Prove that $\sim p \vee (p \vee q)$ is a tautology.
9. If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6\}$ and $C = \{1, 4, 7, 8\}$ determine $A \cap B \cap C = (A \cap B) \cap C$ and also verify that :
- (a) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- (b) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
10. The negation of the conjunction of two propositions is logically equivalent to the disjunction of their negation i. e. $\sim (p \wedge q) \equiv \sim p \vee \sim q$.

