

2014

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) Which is not property of group ?

(i) Inverse

(ii) Cumulative

(iii) Association

(iv) Identity

(b) If Relation $R = \{(1, 1), (1, 2), (2, 2) (1, 3),$

$(2, 3), (3, 1), (3, 3)\}$ on set $A = \{1, 2, 3\}$, then R

is only :

(i) Reflexive only

(ii) Symmetric only

(iii) Reflexive, Symmetric and Transitive

(iv) All of the above

(c) Find the determinant of the matrix

$$\begin{bmatrix} 5 & -2 & 3 \\ 4 & -1 & -5 \\ 6 & 7 & 9 \end{bmatrix} :$$

(i) 364

(ii) 340

(iii) 76

(iv) 14

(d) In regular graph, every node have :

(i) Unequal degree

(ii) Equal degree

(iii) 1 degree

(iv) 0 degree

(e) The simplification of expression $ABC + A'BC$

is :

(i) BC

(ii) AC

(iii) ABC

(iv) None of these

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

(i) 1

(ii) 0

(iii) Both (i) and (ii)

(iv) Not defined

(g) Suppose A is finite set and $n(A) = m$, then :

(i) m^2

(ii) m

(iii) 2^m

(iv) None of these

Group – B

(Long-answer Type Questions)

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

2. Represent the following by Ven Diagram :

(a) $A - (B \cap C)$

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

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

3. Prove that :

(a) $(A \cup B)' = A' \cap B'$

(b) $(A \cap B)' = A' \cup B'$

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

$10x + y + z = 12$; $2x + 10y + z = 13$; $x + y + 5z = 7$

5. Define with example the following :

(a) Simple graph

(b) Complete graph

(c) Bipartite graph

(h) The number of spanning trees in the complete graph K_4 :

(i) 16

(ii) 32

(iii) 48

(iv) 8

(i) $A \cap (B \cup C) =$ _____

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

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

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

(v) None of these

(i) $(A - B) \times (C - D) =$ _____

(ii) $(A \times D) - (B \times C)$

(iii) $(A \times C) - (B \times D)$

(iv) $(A \times B) - (C \times D)$

(v) None of these

(d) Path and Trail

(e) Regular graph

6. Prove the following using truth table :

(a) $(\sim P \vee Q) \wedge (P \wedge (P \wedge Q)) \equiv P \wedge Q$

(b) $P \rightarrow (Q \rightarrow P) \equiv \sim P \rightarrow (P \rightarrow Q)$

7. Explain about the following :

(a) Tautology and Fallacy

(b) Conjunction and Disjunction

(c) Equivalence relation

