2008-09

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
(Compulsory)

Answer all questions : \(2 \times 10 = 20\)

1. Select the correct option from the following :

(a) \(\underline{\hspace{4cm}}\) which is not a property of group :

(i) Cumulative
(ii) Inverse
(iii) Identity
(iv) Associative

(b) If Relation \(R = \{(1, 1), (1, 2), (3, 3), (1, 3), (3, 1)\}\) on set \(A = \{1, 2, 3\}\), then \(R\) is only :

(i) Reflexive

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(Turn over)
(ii) Reflexive and Symmetric
(iii) Not Symmetric
(iv) Symmetric but not Reflexive

(c) What is the rank of the following Matrix ?

\[
\begin{pmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1
\end{pmatrix}
\]

(i) 0
(ii) 1
(iii) 2
(iv) 4

(d) In Regular graph, every node have :

(i) 0 degree
(ii) 1 degree
(iii) Equal degree
(iv) Unequal degree

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

(i) 0
(ii) 1
(iii) Not defined
(iv) Both (a) and (b)
(f) How many minimum colors are required for coloring the following graph?

(i) 1  
(ii) 2  
(iii) 3  
(iv) 4

(g) The simplification of expression $AC + AB + B$ is:

(i) $AC + AB + B$  
(ii) $AC + B$  
(iii) $AC + AB$  
(iv) $AB + B$

(h) Multi graph have _______ path from one node to another:

(i) 0  
(ii) Many*  
(iii) Infinite  
(iv) Two
(i) Tautologies and contradiction means:
   (i) All true, all false
   (ii) All true, some false
   (iii) Some true, all false
   (iv) Some true, some false

(j) Partition of set $A = \{1, 2, 3, 4\}$ is:
   (i) $\{1, 2\}, \{4, 5\}$
   (ii) $\{1, 2, 3\}, \{4, 5\}$
   (iii) $\{1, 2\}, \{2, 3\}, \{4, 5\}$
   (iv) $\{1, 2, 3, 4\}, \{5, 6\}$

**Group – B**

Answer any **four** questions.

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

   (a) $X + Y + 2Z = 4$
   (b) $2X - Y + 3Z = 9$
   (c) $3X - Y - Z = 2$

3. If:

   $$A = \begin{pmatrix} 3 & 7 & -2 \\ 2 & 3 & 1 \\ 4 & 5 & 9 \end{pmatrix}$$

   $$EL - 7/1 \quad \begin{pmatrix} 4 \end{pmatrix}$$

   Contd.
Find:
(a) Transpose of A
(b) Adjoint of A
(c) Inverse of A

4. Solve the following system of linear equation by Gauss elimination method:
(a) $2X + 8Y + 2Z = 14$
(b) $X + 6Y - Z = 13$
(c) $2X - Y + 2Z = 5$

5. In a group of 40 students, 22 can speak Hindi only, 12 can speak English only. How many can speak both Hindi and English languages?

6. What is graph? Define multi-graph degree of directed and undirected graph? What is weighed graph?

7. Represent using input NOR - Gate only $Y = (A \bar{B} + C)$.

8. Define the following terms:
(a) NULL matrix
(b) Orthogonal matrix
(c) Union
(d) Intersection
(e) Transpose of matrix

9. Represent the following by Venn diagram: 15
   (a) A − B
   (b) A \cap B
   (c) (A \cup B) \cap C
   (d) A \cap B \cap C

10. Let P and Q stands for the statement 2 + 3 = 5
    and 3 + 7 = 8 respectively. Describe the following
    statements: 15
    (a) P \land Q
    (b) \neg P \land Q
    (c) P \land \neg Q
    (d) \neg P \land \neg Q
    (e) P \lor Q

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