

DE-3397

Sub. Code

15

DISTANCE EDUCATION

B.Sc. (Computer Science) DEGREE EXAMINATION,
MAY 2016.

DISCRETE MATHEMATICS

(2007 onwards)

Time : Three hours


Maximum : 100 marks

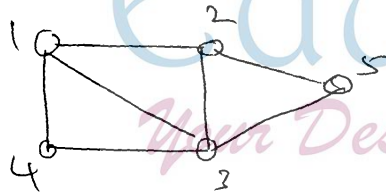
Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Construct truth table for $(P \vee Q) \vee \neg P$. TM
 (b) Prove $(P \rightarrow Q) \Leftrightarrow (\neg P \vee Q)$.
 (c) Explain about conditional and bi-conditional statements.
 (d) Symbolize the expression "All the world loves a lover".
(5 + 5 + 5 + 5)
2. (a) What are set operations? Explain with examples.
 (b) Show that for any two sets A and B
 $A - (A \cap B) = A - B$. (10 + 10)
3. (a) Let $X = \{1, 2, \dots, 7\}$ and
 $R = \{ \langle x, y \rangle \mid x - y \text{ is divisible by } 3 \}$.
 Show that R is an equivalence relation.
 (b) Let R and S be two relations on a set of positive integers I .
 $R = \{ \langle x, 2x \rangle \mid x \in I \}$
 $S = \{ \langle x, 7x \rangle \mid x \in I \}$
 Find $R \circ S$, $R \circ R$, $R \circ R \circ R$ and $R \circ S \circ R$. (10 + 10)

4. (a) Write all possible functions from $x = \{1, 2\}$ to $y = \{a, b, c\}$ and classify them into one-to-one onto, neither one-to-one nor onto types of functions.
- (b) If $f: A \rightarrow B$ and $B \rightarrow C$ are bijections, prove that $g \circ f: A \rightarrow C$ is also a bijections. (10 + 10)
5. (a) What do you mean algorithm? Explain the complexity of algorithms.
- (b) Define and give examples for the following :
 (i) Semi group
 (ii) Monoid. (10 + 10)
6. (a) State and prove Lagrange's theorem.
- (b) If $\langle G, * \rangle$ is an abelian group, then for all $a, b \in G$. Show that $(a * b)^n = a^n * b^n$. (10 + 10)
7. (a) Find the left cosets of $\{[0], [3]\}$ in the group $\langle z_6, t_6 \rangle$. 
- (b) Define the following with examples.
 (i) Complete graph
 (ii) Bipartite graph
 (iii) Regular graph
 (iv) Null graph. (10 + 10)
8. (a) Define : Adjacency matrix of the graph and find the adjacency matrix of the following graph.



- (b) Explain the Konigsberg bridge problem. (10 + 10)