

END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-JUNE 2014

Paper Code: BCA-102

Subject: Mathematics - II
(2011 Onwards)

Time : 3 Hours

Maximum Marks: 75

Note: Attempt any five question, including Q.no.1 which is compulsory.
Select one question from each Unit.

- Q1 (a) Show that:- (3)
 $(A-B)-C = A-(B \cup C)$
 (b) Define:- (i) Universal Set (ii) Power Set (iii) Complement of Set. (3)
 (c) Define equivalence relation with example. (3)
 (d) Define POSET with example. (3)
 (e) Define (i) Tautology (ii) Contradiction. (2)
 (f) Define Homomorphic and Isomorphic graph with example. (3)
 (g) Let f, g be function from N to N (Set of natural no) for $N \in N$ s.t.
 $f(n) = n + 1, g(n) = 2n$.
 Find $f \circ g$ and $g \circ f$. (3)
 (h) Show that the function $f(x) = x^2$ and $g(x) = x^{1/2}$ for all $x \in R$ are
 inverses of one another. (2)
 (i) Define Distributed & Complemented Lattice. (3)

Unit-I

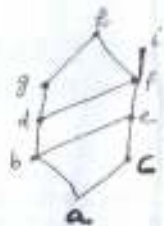
- Q2 (a) Show that the mapping $f: Z^+ \rightarrow Z^+$ defined by $f(x) = x^2, x \in Z^+$ is set of
 +ve integers, is one-one & onto mapping. (6.5)
 (b) Define partial order relation and prove that the relation \leq (less than or
 equal to) is partial order relation on N (set of natural numbers). (6)
- Q3 (a) If R & S are equivalence relation in a set X , prove that $R \cap S$ is an
 equivalence relation. (6.5)
 (b) In a survey of 80 people, it was observed that 30 people read
 Hindustan Times, 25 read Times of India, 28 read The Tribune, 15
 read both Hindustan Times and The Tribune, 18 read both Times of
 India and The Tribune, 20 read both Hindustan Times and Times of
 India and 5 read all three newspapers. Find:-
 (i) The number of people who read at least one of the three newspapers.
 (ii) The number of people who read no newspaper at all. (6)

Unit-II

- Q4 (a) Let D_{24} denote the set of all divisors of 24. Considering the partial
 order of divisibility in D_{24} , Draw Hasse Diagram D_{24} . (6)
 (b) Define Lattice. (L, \leq) .
 And prove that if $a, b, c \in L$, then
 $a \leq c$ if and only if and only if $a \vee (b \wedge c) \leq (a \vee b) \wedge c$ (6.5)
- Q5 (a) Find the power and upper bounds of the subsets $\{a, b, c\}$, $\{b, d\}$ and
 $\{a, c, d, f\}$ in the poset with Hasse diagram shown in figure.
 Also find the greatest lower bond and least upper bond of $\{b, d, g\}$. (6)

P.T.O.

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- (b) Let $A = \{1, 2, 3, 4, 5, 6\}$ be ordered set shown in figure. Find. (6.5)
- (i) All minimal and maximal element of A.
 - (ii) Greatest and least element of A.



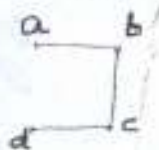
UNIT-III

- Q6 (a) Show that the given pair of graph are isomorphic. (6.5)

G_1 :

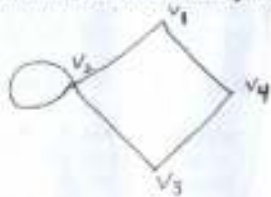


G_2 :



- (b) Define Adjacent Matrix. Find the adjacency matrix the graph G. (6)

G_1 :



G_2 :



- Q7 (a) Define:- (i) Sub graph (ii) Cut-edges. (6)
- (iii) Cut-vertices (iv) Hamilton Graph.
- (b) Draw the directed graph for following Incidence Matrix. (6.5)

$$\begin{matrix}
 & e_1 & e_2 & e_3 & e_4 & e_5 & e_6 & e_7 & e_8 \\
 v_1 & [-1 & 0 & 0 & 0 & -1 & -1 & 1 & 0 \\
 v_2 & [1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 \\
 v_3 & [0 & -1 & -1 & 0 & 0 & 1 & 0 & 0 \\
 v_4 & [0 & 0 & 1 & 1 & 0 & 0 & -1 & 0 \\
 v_5 & [0 & 0 & 0 & -1 & 1 & 0 & 0 & -1]
 \end{matrix}$$

Also find the degree of all vertex.

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UNIT-IV

- Q8 (a) Construct the truth table of the following:- (6)
- (i) $(p \vee \sim q) \vee \sim p$
 - (ii) $(\sim q \rightarrow \sim p) \rightarrow (p \rightarrow q)$
- (b) Show that following are tautologies:- (6.5)
- (i) $(p \wedge (p \rightarrow q)) \rightarrow q$
 - (ii) $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$

- Q9 (a) Consider the following:- (6)

p: Today is Tuesday
q: It is raining
r: It is cold

Write in simple sentences the meaning of the following:-

(i) $\sim q \Rightarrow (r \wedge p)$ (ii) $(p \vee q) \Leftrightarrow r$

- (b) What is the truth value of the quantification $(\exists x) Q(x)$, if the statement $Q(x)$ and inverse of discourse is given as follows:- (6.5)

(i) $Q(x) : x > 32$ $U = \{\text{all real numbers}\}$

(ii) $Q(x) : x = x + 2$ $U = \{\text{all real numbers}\}$

(iii) $Q(x) : x^2 < 12$ $U = \{\text{positive integer not exceeding 3}\}$

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