(Please write your Exam Roll No.) **Exam Roll No.** 01414202012

END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-JUNE-2013

Paper Code: BCA102	***Subject: Mathematics-II***
Time : 3 Hours	***Maximum Marks :75***

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

Q1 (a) Find the domain and range of the function $f(x)=1/\sqrt{x-2}$. **(3)**

(b) Let $A=\{2,3,7,8\}$, $B=\{1,3,5\}$, $C=\{3,5,9,11\}$. Find $A\Delta B$ and $B\Delta C$. **(3)**

(c) Show that the relation '≤' is partial order relation on the set of natural numbers. (Where '≤' means less than or equal to). **(3)**

(d) Show that the relation $R=\{(1,1),(1,2),(2,2),(3,3)\}$ is reflexive relation but not identity on the set $A=\{1,2,3\}$. **(2)**

(e) Consider the graph G(V,E) where V consists of four vertices A,B,C,D and E consists of five edges e1, e2, e3, e4, e5 where $e_1=\{A,B\}$, $e_2=\{B,C\}$, $e_3=\{C,D\}$, $e_4=\{A,C\}$ and $e_5=\{B,D\}$ represent this undirected graph diagrammatically determine the degree of each vertex. **(3)**

(f) By means of truth table, prove that $\sim(P\Leftrightarrow q)\equiv\sim P\Leftrightarrow q\equiv P\Leftrightarrow\sim q$. **(3)**

(g) Verify that $PV\sim(P\wedge q)$ is a tautology. **(2)**

(h) Find the Adjacency matrix of graph a shown in fig.1 below. **(3)**

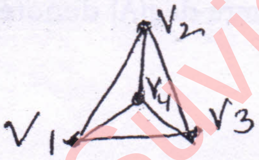


Fig. 1

(i) Let the universal set is $U=\{1,2,3,4,5,6,7\}$, $A=\{1,3,4,5\}$ and $B=\{1,2,4,6\}$ verify De-morgan's Laws. **(3)**

UNIT-I

Q2 (a) Let R denotes the set of all real numbers and $F:R\rightarrow R$ be a function defined as $F(x)=4x+5\forall x\in R$. Show that F is both one-one and onto and also find $f^{-1}(y)$. **(6.5)**

(b) If R is an equivalence relation in a set A then prove that R^{-1} is also an equivalence relation. **(6)**

Q3 (a) Prove that (i) $A-(B\cap C)=(A-B)\cup(A-C)$

(ii) $Ax(B\cup C)=(AxB)\cup(AxC)$, If A, B, C are sets. **(6.5)**

(b) Let $N=\{1,2,3...\}$ denote the set of all positive integers $A=\{x:x\in N \text{ and } 3<x<12\}$ and $B=\{x:x\in N; x \text{ even}, x<15\}$. Find $A\cap B$, $A\cup B$, A^C and B^C where A^C and B^C are denoted the complements of A and B in N. **(6)**

UNIT-II

Q4 (a) Let $S=\{1,2,3\}$, then for $(P(S),\subseteq)$. Find maximal, minimal, greatest and least elements and also prove that $(P(s),\subseteq)$ is a Poset. **(6.5)**

(b) Let $D_{100}=\{1,2,4,5,10,20,25,50,100\}$ and let the relation be ≤ the relation/(divides) be a partial ordering on D_{100}. **(6)**

P.T.O.

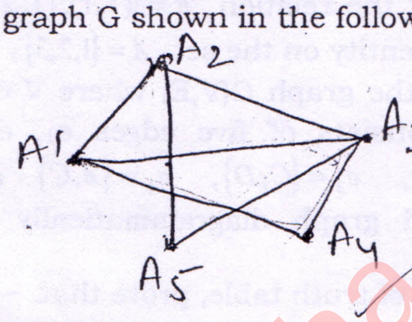
(i) Determine the glb of B, where $B = \{10,20\}$.
(ii) Determine the lub of B, where $B = \{10,20\}$.
(iii) Determine the glb of B, where $B = \{5,10,20,25\}$.
(iv) Determine the lub of B, where $B = \{5,10,20,25\}$.

Q5 (a) Define a Lattice $L = \{L, \wedge, \vee\}$ where ^ and are binary operations called meet and joint respectively. Prove that for all $a \in L$, $b \in L$, $a \wedge b = a$, if and only if $a \vee b = b$. **(6.5)**

(b) Let D_n denote the set of all positive divisors of the positive integers n. Determine D_{16} and represent it by means of the Hasse diagram. **(6)**

UNIT-III

Q6 Consider the undirected graph G shown in the following diagram- **(12.5)**



(a) The set V(G) of all vertices of G.
(b) The set E(G) of all edges of G.
(c) $\deg(Ai) = i = 1,2,3,4,5$ Where deg(A) denotes the degree of the vertex A.
(d) $\sum_{i=1}^{5} \deg(Ai)$.
(e) Number of edges.
(f) Verify that $\sum_{i=1}^{5} \deg(A_i) = 2(Number\ of\ edges)$.

Q7 Consider the following adjacent matrix $A = \begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix}$. Draw the undirected graph G corresponding to the matrix A and also find the degree of all vertex. **(12.5)**

UNIT-IV

Q8 (a) Draw the truth table for the following statement "If P implies q, q implies r, then P implies r". **(6)**

(b) By means of truth tables, justify that the conditional, statement, "If P then Q" is logically equivalent to the statement "Not P or q". **(6.5)**

Q9 (a) Define (i) Tautology (ii) Contradiction (iii) Contingency with example using truth table. **(6)**

(b) Verify De-Morgan's law in proposition and also prove that $P \wedge (q \vee r) \equiv (P \wedge q) \vee (P \wedge r)$. **(6.5)**

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