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

END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-JUNE 2016

Paper Code: BCA-102	*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) Show that the relation '≤' is partial order relation on the set of natural numbers. (Where '≤' means less than or equal to). **(3)**

(b) Show that $(A \cup B)^c = A^c \cap B^c$. **(3)**

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

(d) Define Tautology and Contradiction. **(3)**

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

(f) If $f(x) = x^3$, then find f^1 for all $x \in R$. **(3)**

(g) Verify De-morgan's laws for universal set U = {1, 2, 3, 4, 5, 6, 7}, A = {4, 1, 2, 5} and B = {1, 2, 4, 6}. **(3)**

(h) Define Distributed & Complemented Lattice. **(2)**

(i) Define POSET with example. **(2)**

Unit-I

Q2 (a) If R is an equivalence relation in a set A, then prove that R^{-1} is also an equivalence relation. **(6)**

(b) Let $U = \{a, b, c, d, e\}$, $A = \{a, b, d\}$ *and* $B = \{b, d, e\}$. Find (i) $A \cup B$, (ii) $B \cap A$, (iii) B – A (iv) $A^c \cap B$ (v) $B^c - A^c$. **(6.5)**

Q3 (a) Let $f: R \to R$ be defined by **(6)**

$$f(x) = \begin{cases} 3x + 2; & x > 0 \\ 2x + 3; & x \leq 0 \end{cases}$$ then find $f^{-1}(0), f^{-1}(1), f^{-1}(-3)$.

(b) Define the relation "congruence modulo m." Show that it is an equivalence relation in set of integers. **(6.5)**

Unit-II

Q4 (a) Let (L, ≤) be a lattice, then prove that for every element $a, b \in L$, **(6)**

(i) $a \vee b = b \;\; iff \;\; a \leq b$

(ii) $a \wedge b = a \;\; iff \; a \leq b$

(iii) $a \wedge b = a \;\; iff \; a \vee b = b$

(b) Prove that every finite lattice L is bounded. **(6.5)**

Q5 (a) Find the complements of each element in D_{42}. **(6)**

(b) Let R be the relation of divisibility on set A. Draw the Hasse diagram of poset relation R where A = {2, 4, 8, 16, 32). **(6.5)**

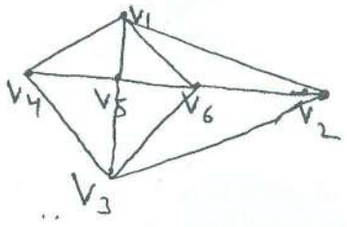
P.T.O.

BCA-102

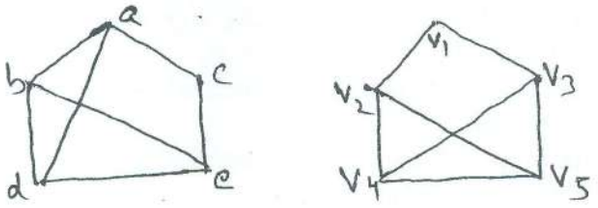
P.1/2

Unit-III

Q6 (a) Find the chromatic number of the graph given below using the Welch-Powell algorithm. **(6)**



(b) Show that the graphs are isomorphic. **(6.5)**



Q7 (a) Draw a 3-regular graph with 6 vertices. **(6)**
(b) Prove that the degree of any vertex in a simple graph of n vertices cannot exceed n – 1. **(6.5)**

Unit-IV

Q8 (a) Prove that $(p \rightarrow q) \Leftrightarrow (\sim q \rightarrow \sim p)$ is a tautology. **(6)**
(b) Show that $p \leftrightarrow q$ logically implies $p \rightarrow q$. **(6.5)**

Q9 (a) Prove that $p \rightarrow (q \wedge r) \equiv (p \rightarrow q) \wedge (p \rightarrow r)$. **(6)**
(b) Prove that $p \vee (q \wedge r) \equiv (p \vee \overline{q}) \vee \overline{r}$. **(6.5)**

****

BCA-102
P2/2