(Please write your Exam Roll No.) Exam Roll No. 06917702017

END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY 2018

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 atleast one question from each unit.

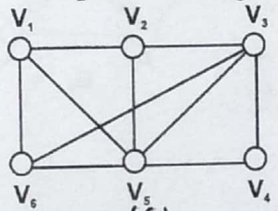
Q1. a) Let A= {1, 2, 3} and R= {(1,1), (1,2), (2,1), (2,2), (3,3)}. Show that R is equivalence relation. **(5)**

b) For all n ≥1, let a recursive function f(n) be defined as

$$f(n)=\begin{cases}1 & n=1\\ 1+f(n/2) & n-even\\ f(3n-1), & n>1\ and\ odd\end{cases}$$. Is f a well defined function? **(5)**

c) Let A= {1,2,3,9,18}. Consider the partial order of divisibility on A. Draw the Hasse diagram of the poset (A,≤). **(5)**

d) Find all paths of length 2 in the following graph G. **(5)**



(G)

e) Check the validity of the argument:
If Dr. Das buys a car, then he can go home in time. If he goes in time, then his family will be happy. **(5)**

Unit-I

Q2. a) Construct the truth table to determine whether each of the following is a tautology, or an absurdity.? **(6)**

i) P∨~P   ii) P∧~P

b) Show that P∨q ≡ q∨p, ~ (P∨q) ≡ ~ p ∧~q. **(6.5)**

Q3. If p(x) and Q(x) are propositions, then prove that

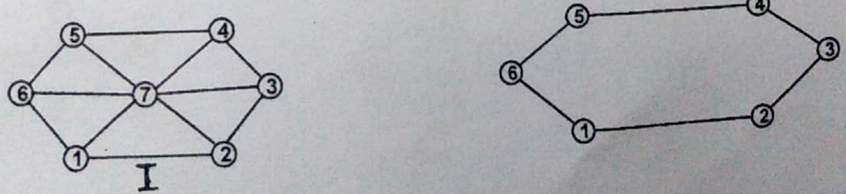
i) $(\forall x\ p(x)) \vee (\forall x Q(x)) = (\forall x\ (p(x) \vee Q(x))$

ii) $\exists x(p(x) \wedge Q(x)) = \exists x\ p(x) \wedge \exists x\ Q(x)$.

Are (i) and (ii) tautologies? **(12.5)**

Unit-II

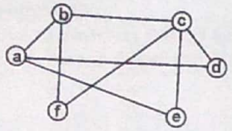
Q4. a) Is H a subgraph of I shown in the following figure? Explain it. **(6)**



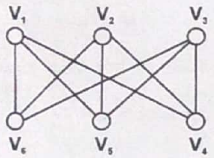
P.T.O.

P1/3

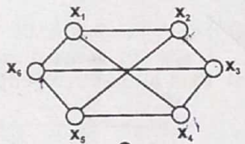
b) Define bipartite graphs. Verify whether following graph is bipartite or not. **(6.5)**



Q5. Show that the graph $G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$ are isomorphic.



G_1

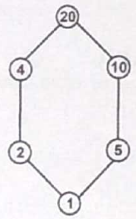


G_2

Unit-III

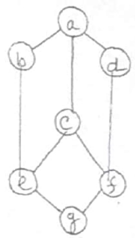
Q6. a) Consider a poset ({1,2,4,5,10,20},|) as described by Hasse diagram in the following. **(6)**

Fig.



Show that it is a lattice.

b) Let (L, ≤) be a lattice shown in the following figure where L= {a,b,c,d,e,f,g}. Define an algebraic system on A. **(6.5)**



P 2/3 P.T.O.

Q7. a) IN Q 6a, consider the following subset of lattice **(6)**
i) S= {2,4,10,20}
ii)S={4,5,10,20,}
iii) S= { 1,2,5,10}

Determine whether the above subset of the lattice is a sublattice.

b) Define distributed and complemented lattices. In Q 6a, find the complement the element 4. Is the lattice given in Q6a complemented lattice. **(6.5)**

Unit-IV

Q8. a) Let A = B=R the set of real numbers. Let f: A→B be given by the formula $f(x)=4x^5-1$ and let g: B→A be given by $g(y)=\left(\frac{(y+1)}{4}\right)^{\frac{1}{5}}$. Show that f is bijection and g is also bijection. **(6)**

b) Let R be the set of real number and let f:R→R be defined by $f(x)=x^4$. Is f invertible? **(6.5)**

Q9. a) *Let u={x/x ∈ Z^+, x≤9}, A= {1,3,5,7}, B= {2,4,6} C= {1,2,3,4}. Find (i) (AUC)-B (ii)* $\overline{AUB}$ *(iii)* $(\overline{\overline{A}UB})$ **(6)**

b) Prove the following: **(6.5)**
i) $(\overline{AUB}) = \overline{A} \cap \overline{B}$ ii) $\overline{A \cap B} = \overline{A} \cup \overline{B}$

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