Printed Pages: 4

RCA - 103

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289913 Roll No. | | | | | | | | | |

M.C.A.

Regular Theory Examination (Odd Sem-I) 2016-17

DISCRETE MATHEMATICS

Time : 3 Hours *Max. Marks : 70*

SECTION - A

1. Answer all parts. All parts carry equal marks. Write answer of each part in short. (5×2=10)

a) Define a relation R which is Reflexive, Symmetric, Anti-symmetric and Transitive for a set $A = \{1,2,3,4,5\}$

b) Define the bounded lattice.

c) Write the conjunctive normal form for the expression $(y+z')$ of three variable x, y, z.

d) Write converse and inverse for the following statement "If x+3 = 8 then x = 6"

e) Given an example of homogenous and non-homogeneous recurrence relation of order 4 and degree 3.

SECTION - B

Attempt any five questions from this section. **(5×8=40)**

2. Show that for any two sets A and B. $A-(A\cap B)=A-B$.

   Also find the values $A-(A\cap B)$ and $A-B$ for set $A=\{1,2,3,4,5\}$ $B=\{2,3,4,6\}$.

3. What is composition of functions? Also prove that $f^{1}\ o\ g^{-1}=(gof)^{-1}$ where $f:Q\to Q$ such that $fx)=4x$ and $f:Q\to Q$ such that g(x) = x+4 are two functions.

4. Let S = {1,2,3.....,12} be a poset under divisibility relation. Draw Flasse diagram and find first element & Last element. Also find upper bound, lowe bound, Least Upper Bound & Greatest Lower Bound for the subset {5,7,8}.

5. Simplify the Boolean expression f(w, x, y, z) = $\sum(0,1,3,5,9,11,12,14)$ by using K-map. Also draw the logic and circuit diagram of the simplified expression.

6. Define Boolean algebra. If $(B,+,\bullet\ ,'\ ,0,1)$ is a Boolean algebra and $a,b\in B$ then prove that $(a+b)'=a'*b'$

7. Explain the quantifiers in details. Also write the following English language into symbolic statement.

"Every students of this university is either academician or sportsman".

8. Define Inference theory. Also explain the rules of inference with example.

9. Find complete solution of the recurrence relation $u_n - 4u_{n-1} + 3u_{n-2} = 5^n + n$

SECTION - C

Attempt any two questions from this section. **(2×10=20)**

10. a) If A be non empty set with n elements then prove that the number of function from $A \to A$ is less than the number of relation from $A \to A$ i.e. $n^n < 2^{n2}$

b) If $(A, \leq)$ $(B, \leq)$ are posets, then $(A \times B, \leq)$ is a poset with partial order defined by $(a,b) \leq (a',b')$ if $a \leq a'$ in A and $b \leq b'$ in B.

11. a) Define disjunctive normal form (DNF). Also find the DNF for the following Boolean expression.

$(a \times b') + (b \times c') + (c \times a')$

b) Define tautology. Prove that the statement $(p \wedge q) \rightarrow (p \vee q)$ is tautology.

12. a) Define pigeon hole principle. Find the minimum number of boys born in the same minute out of 3000 boys on a day.

b) In a MCA class of 40 students 5 are weak. Determine how many ways we can make a group of students

i) Five good students

ii) Five students in which exactly three are weak.
