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Total No. of Questions : 07] [Total No. of Pages : 02

Paper ID [B0207]

(Please fill this Paper ID in OMR Sheet)

BCA (Sem. - 2nd)

MATHEMATICS - I (Discrete Maths) (BC - 203)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.

Section - A

Q1) *(10 × 2 = 20)*

a) Draw a line diagram for the sets ϕ, X (universal set), A, B, A–B and B– A.

b) Define one-one and onto functions.

c) Show that for any two sets A & B, $(A \cap B)^c = A^c \cup B^c$.

d) Using principle of mathematical Induction, Prove that

$1 + 3 + 5 + \text{——} + (2n-1) = n^2$.

e) Construct a truth table for $p \vee q$.

f) Solve the recursence relation $S(k + 2) - 6S(k + 1) + 9S(k) = 0$

g) What do you mean by source & Sink.

h) Give two properties of binary tree.

i) In how many ways can 3 persons be chosen out of 5 persons without repetition.

j) Define equivalence relation.

P.T.O.

Section - B

(4 × 10 = 40)

Q2) (a) Prove that the empty set ϕ is a subset of every set.

(b) If R and S are transitive relations on a set A then prove that R $\wedge$ S is also a transitive relation.

Q3) (a) Show that $(p \wedge q) \wedge \sim (p \wedge q)$ is a fallacy.

(b) Solve the recurrence relation $S(k) - 7S(k-1) + 10S(k-2) = 6 + 8k$ Where $S(0) = 1$, $S(1) = 2$.

Q4) (a) Find the number of combinations that can be obtained from the letters of the word "COMMERCE" taken 4 at a time.

(b) There are five different doors to a hole. In how many ways a rat can go in & come out of the hole, if in coming out, that rat choses

(i) any of the doors.

(ii) the door in which it went in.

Q5) (a) Prove that there does not enist a graph with five vertices of degrees 1, 3, 4, 2, 3 respectively.

(b) Prove that a graph which contains a triangle cannot be bipartite.

Q6) (a) Show that the function

$f: R \to R$ given by

$f(x) = \cos x$ for all $x \in R$ is neither one - to -one nor onto.

(b) Show that there is one and only one path between every pair of vertices in a tree, T.

Q7) (a) Determine the sequence whose generating function is

$$G(s,z) = \frac{3-5z}{1-2z-3z^2}.$$

(b) Prove by mathematical Induction that

$$\frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \text{——} + \frac{1}{(2n+1)(2n+3)} = \frac{n}{3(2n+3)}.$$

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