

Paper ID [BC203]

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BCA (Sem. - 2nd)

MATHEMATICS - I (BC - 203)

(Discrete)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

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

Section - A $(10 \times 2 = 20)$ **Q1)**

- a) Write the power set of the set $\{\phi\}$.
- b) Define equivalence relation.
- c) If two cubical dice are thrown, in how many ways can they fall?
- d) Show that $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ by using principle of

Mathematical Induction.

- e) Solve the recurrence relation:-

$$S(K+2) - 7S(K+1) + 12S(K) = 0$$

- f) Define Hamiltonian graph.

- g) Determine the total number of vertices, and the number of interior vertices, where a binary tree has 20 leaves.

- h) Prove that ${}^nC_r = {}^nC_{n-r}$.

- i) Construct a truth table for $p \wedge q$.

- j) Given $A = \{1, 2, 3, 4, 5\}$, $B = \{1, 2, 3, \dots, 15\}$ and $f(x) = 3x - 1$

Find (i) the domain of the function.

(ii) the co-domain of the function.

Section - B $(4 \times 10 = 40)$ **Q2)**

- (a) If a set A contains n elements, show that power set of A contains 2^n elements.
- (b) If ' $\sim$ ' is a relation defined on $N \times N$, where N is a set of natural numbers, such that $(a, b) \sim (c, d)$ iff $ad = bc$. Prove that ' $\sim$ ' is an equivalence relation.