B.C.A. SEM. – 01   Seat No._____
Core Course BCA-CC–106 Code: 22638
Subject Title –Mathematics

Time: 2 ½ Hours]   [Total Marks: 70

Q.1   Explain operations of set theory: Union, Intersection, Difference. [18]
        Also explain associative law and distributive law of set theory.

OR

Q.1 (A) Let $f(x) = \frac{3x+2}{x-1}$, $g(x) = 2x + 3$. Then find $f^{-1}(x)$, $g^{-1}(x)$. [9]

     (B) For $U = \{x \in N \,|\, 1 \leq x \leq 20\}$, $A = \{1,2,4,5,8,9,14,19,20\}$ [9]
          and $B = \{1,5,9,13,20\}$ verify De'Morgan's Law.

Q.2   If $\bar{a} = (2,-3,5)$, $\bar{b} = (-1,2,0)$ and $\bar{c} = (1,3,-3)$ then find [18]

        $(i)\ \bar{a} + \bar{b}$ $(ii)\ \bar{a} \cdot \bar{c}$ $(iii)\ \bar{b} \cdot (\bar{a} + \bar{c})$ $(iv)\ \bar{b} \times \bar{c}$ $(v)\ 3(\bar{b} - \bar{c})$
        $(vi)\ |\bar{c} \times \bar{a}|$ $(vii)\ |\bar{b} \cdot \bar{a}|$ $(viii)\ \bar{a} \times \bar{b} \times \bar{c}$ $(ix)\ 5\bar{b} \cdot \bar{c}$.

OR

Q.2 (A) If $A = \begin{bmatrix} 7 & 3 \\ 6 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -3 \\ 0 & 5 \end{bmatrix}$ then find A^{-1} and B^{-1}. [9]

     (B) Explain with example: Symmetric and skew-symmetric matrix. [9]

Q.3   From 2 wicket keepers, 7 batsman, 6 bowlers and 2 all-rounder, [17]
        a cricket team of 11 players is to be formed. In how many ways,
        this can be done, if the team contains:
        (i) Exactly 5 bowlers and at least one all-rounder (ii) At least 1
        wicket keeper, at least 4 bowlers and exactly one all-rounder (iii)
        At least 5 batsman and exactly one wicket keeper.

OR

Q.3 (A) Prove in usual notations: ${}_nP_r = {}_{(n-1)}P_r + r \cdot {}_{(n-1)}P_{(r-1)}$. [9]

     (B) Find $(i)\ {}^{100}C_{98}$ $(ii)\ ({}^6P_3)({}^6C_3)$ $(iii)\ {}^{101}C_1$ $(iv)\ {}^nP_0 + {}^nC_0$. [8]

Q.4   Explain with example: (i) Connected graph (ii) Isomorphism of [17]
        graphs (iii) Rooted tree (iv) Incidence between vertex and edge.

OR

Q.4 (A) Discuss about properties and uses of binary tree. [9]

     (B) Explain in detail (i) Adjacent Vertices (ii) Degree of a vertex. [8]

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