

29 NOV 2018

Code: 20201

B.C.A. Semester – 1 CBCS (NEW)

Core Course CC-104: Mathematics

Time: 2 ½ Hours

Total Marks: 70

- Q.1 (a) For $A = \{1,2,5,6,8\}$, $B = \{2,4,6,10,11\}$ and $C = \{1,2,3,5,11,12\}$, [7]
verify $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.
- (b) If $f(x) = x^2 + 3x + 4$ and $g(x) = 3x + 2$, prove that $f(1) - g(2) =$ [7]
0.

OR

- Q.1 (a) Verify D'Morgan Laws for $U = \{n | n \leq 10, n \in N\}$, $A = \{n | n > 5, n \in N\}$ and $B = \{3, 6, 9\}$. [7]
- (b) If $f(x) = 2x - 1$, $g(x) = 3x + k$ and $g \circ f = f \circ g$ then find k . [7]
- Q.2 (a) Show that: ${}^nP_r = {}^{n-1}P_r \cdot {}^{n-1}P_{r-1}$ [7]
- (b) Find (i) 6C_3 (ii) $({}^7P_2) + ({}^4P_4)$ (iii) ${}^{101}C_1 + {}^{11}P_{10}$ [7]

OR

- Q.2 (a) Find n if (I) $({}^{12}P_r) = 1320$. (II) $4 \cdot {}^nP_3 = 5 \cdot {}^{n-1}P_3$ [7]
- (b) How many different words can be made using the letters of the word WONDERFULL? How many of these will begin with D? [7]
- Q.3 (a) Explain with example of Vector Addition, Unit Vectors, Cross Product. [7]
- (b) Find vector Addition and Dot product: $A = (3, -3, 1)$ and $B = (4, 9, 2)$. [7]

OR

- Q.3 If $\vec{a} = (-2, 3, 5)$, $\vec{b} = (3, -1, -2)$ and $\vec{c} = (7, 1, -1)$ then find [14]
- (i) $\vec{a} + \vec{b}$ (ii) $\vec{a} \cdot \vec{c}$ (iii) $\vec{b} \cdot (\vec{a} + \vec{c})$ (iv) $\vec{b} \times \vec{c}$
- (v) $3(\vec{b} - \vec{c})$ (vi) $|\vec{c} \times \vec{a}|$ (vii) $|\vec{b} \cdot \vec{a}|$

Q.4 (a) If $A = \begin{bmatrix} 7 & 13 \\ 3 & 15 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 0 \\ -7 & 6 \end{bmatrix}$ and $A + X = B$ then find the matrix X . [7]

(b) Find inverse matrix of the matrix $\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$. [7]

OR

Q.4 (a) Define and give one example of each of the following: [7]

(i) Square matrices (ii) Diagonal Matrix (iii) Transpose of a Matrix.

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

Q.5 Define the following terms and give one example of each: [14]

(i) Loops (ii) Simple Graph (iii) Isolated Vertex (iv) Degree of a vertex (v) Labeled Graph (vi) Circuit (vii) Connected Graph

OR

Q.5 (a) Explain isomorphism of graphs. [7]

(b) Define and give one example of each of the following: [7]

(1) Null graph (2) Isolated vertex (3) Complete graph
