JD-123

January-2016

B.C.A., Sem.- I

CC-104 : Basic of Mathematics

Time : 3 Hours] **[Max. Marks : 70**

1. (a) In a survey of 1000 persons it was found that 280 read magazine A, 300 read magazine B, 420 read magazine C, 80 read magazines A and B, 100 read magazines A and C, 50 read magazines B and C and 30 read all three magazines. Find. **8**

    (i) How many read at least one of these magazines ?

    (ii) How many read none of three magazines ?

    (iii) How many read magazine A only ?

    (iv) How many read magazine A and B but not C ?

OR

A = {1, 2, 4, 5}, B = {2, 3, 5, 6}, C = {4, 5, 6, 7}. Verify

    (i) $A - (B \cup C) = (A - B) \cap (A - C)$

    (ii) $A \cap (B \Delta C) = (A - B) \Delta (A - C)$

  (b) If $f : R-\{1\} \rightarrow R$, $f(x) = \dfrac{1 - x}{1 + x}$, then prove that **6**

    (i) $f(x) + f\left(\dfrac{1}{x}\right) = 0$

    (ii) $f(f(x)) = x$

      OR

    (i) If $f(x) = 2x^2 - 5x + 4$, for what value of x is $2f(x) = f(2x)$?

    (ii) Define: function, identity function, modulus function.

2. (a) Solve the following system of equations using matrix inversion method. **8**

      $2x - 2y + z = 1$, $x + 2y + 2z = 2$, $2x + y - 2z = 7$

      OR

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If $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 5 & 6 \\ 0 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 & 5 \\ 0 & 8 & 7 \\ 3 & 1 & 2 \end{bmatrix}$, then verify

(i) $(A + B)^T = A^T + B^T$

(ii) $(AB)^T = B^T A^T$

(b) Find the inverse of the matrix $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & 5 & 6 \\ 1 & 1 & 2 \end{bmatrix}$.   **6**

OR

Find x, if $[1 \ -1 \ x] \begin{bmatrix} 0 & 1 & -1 \\ 2 & 1 & 3 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} = 0$.

3.   (a) Attempt the following :   **8**

(i)   Which point on the X-axis is equidistant from (5, 9) and (– 4, 6) ?

(ii)   Find the co-ordinate of the points which divide AB in the ratio 2 : 3 internally from A where the co-ordinates of A and B are (2, –1) and (–3, 4) respectively.

OR

Attempt the following :

(i)   Find the area of ΔABC whose vertices are A(– 8, – 2), B(– 4, – 6) and C (–1, 5).

(ii)   Find the equation of a line passing through the point (1, 4) and the sum of the intercepts on the axis is 10.

(b) Attempt the following :   **6**

(i)   Find the equation of the line passing through (–3, 2) and making an angle of 45° with the line $3x - 4y + 2 = 0$.

(ii)   Find the equation of the line parallel to $2x + 3y + 7 = 0$ and passing through the point (1, 2).

OR

Attempt the following :

(i)   Find the equation of the line passing through the midpoint of the line segment joining (2, 4) and (4, 2) and perpendicular to $5x - 2y - 7 = 0$.

(ii)   Find the value of x if the distance between $(x, -1)$ and $(3, 2)$ be 5 units.

4. (a) Find the derivatives of the following :   8

(i) $e^x + x^e$

(ii) $\log (2 + 3x + 4x^2)$

(iii) $\dfrac{x^2 + 1}{x^2 - 1}$

(iv) $\mathrm{Log}x \cdot \sin x$

OR

Attempt the following :

(i) $\displaystyle\int e^{2x - 3}\, dx$

(ii) $\displaystyle\int (3 - 2x + x^4)\, dx$

(iii) $\displaystyle\int \dfrac{1}{x + 3}\, dx$

(iv) $\displaystyle\int (5x - 6)^{20}\, dx$

(b) Evaluate the following :   6

(i) $\displaystyle\lim_{x \to 4} \dfrac{x^2 - 3x - 4}{x^2 - 2x - 8}$

(ii) $\displaystyle\lim_{x \to 3} \dfrac{\sqrt{x + 2} - \sqrt{5}}{x - 3}$

OR

Attempt the following :

(i) $f(x) = \dfrac{2x^2 - x - 1}{x - 1}, \; x \neq 1$

$\qquad = K + 2, \qquad x = 1$

For what value of K the function is continuous at $x = 1$?

(ii) Evaluate : $\lim\limits_{x \to 0} \dfrac{2^{3x} - 1}{x}$

5. Do is directed. **14**

(1) If $A \subset B$ and $B \subset A$, then $A = B$ (True/False).

(2) No. of subsets of Set $A = \{\phi\}$ is _____.

(3) If $f(x) = \dfrac{x}{x - 1}$, $f(3) - f(2) = $ _____.

(4) For matrix A and B $(AB)^T = A^T B^T$ (True/False)

(5) If $\begin{bmatrix} 3 & 2x \\ 1 - 3x & 2 \end{bmatrix}$ is symmetric matrix, then $x = $ _____.

(6) For 2×2 matrix if the determinant is zero, then A^{-1} does not exists. (True/False)

(7) The distance of a point (x, y) from the origin is _____.

(8) Slope a line $2x - y + 5 = 0$ is _____.

(9) Equation of a line having slope 2 and passing through $(1, 2)$ is _____.

(10) Equation of a line having x-intercept 3 and y-intercept is 2 is _____.

(11) $\dfrac{d}{dx}(a^x) = $ _____.

(12) $\lim \dfrac{x^n - a^n}{x - a} = $ _____.

(13) $\int \sqrt{x} \, dx = $ _____.

(14) $\int \cos x \, dx = $ _____.

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