Reg. No. | | | | | | | | | |

S.F

BCACACN 103

I Semester B.C.A. Degree Examination, April/May 2022
(NEP – 2020) (2021 – 22 Batch Onwards)
MATHEMATICAL FOUNDATION
(DSCC)

Time : 2 Hours | Max. Marks : 60

Note : *Answer* ***any six*** *questions from Part –* ***A*** *and* ***one full*** *question from* ***each*** *Unit in Part –* ***B****.*

PART – A

(6×2=12)

1. a) Find the distance between the points (–4, –2), (3, –5).
   b) $\text{Log}_5 X = 3$, find the value of x.
   c) Represent the following angles in radians a) 90° b) 45°.
   d) Find $\int 5x^2 dx$.
   e) Define symmetric matrix with an example.
   f) Find [x y] if [4 5] + [x y] = [7 3].
   g) Find the rank of a matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ -4 & 0 & 5 \end{bmatrix}$.
   h) Write formula for finding n^{th} term and sum to n terms in arithmetic progression.

PART – B

Unit – I

2. a) Prove that $\dfrac{\log\sqrt{27} + \log\sqrt{8} - \log\sqrt{125}}{\log 6 - \log 5} = \dfrac{3}{2}$.
   b) Find the 11^{th} term in the expansion of $(y + 4x)^{30}$.
   c) Show that the points (4, 3) (7, –1) and (9, 3) form an isosceles triangle. **(4+4+4)**

P.T.O.

3. a) Find the middle term in the expansion of $\left(x-\frac{1}{2y}\right)^{10}$.

b) Find the coordinates of a point which divides the line joining two points P(8,9) and Q(–7, 4) internally in the ratio 2 : 3 and externally in the ratio 4 : 3.

c) Find the equation of straight line passing through the point (–3, 1) perpendicular to the line $5x - 2y + 7 = 0$. **(4+4+4)**

Unit – II

4. a) If $\sin\theta = \frac{15}{17}$ and θ is an acute angle, find the values of other trigonometric functions.

b) Evaluate $\lim \frac{x^2+2x-5}{x^2-3}$.

c) Differentiate $(3x^2 + 1)(x^3 + 2x)$ with respect to x. **(4+4+4)**

5. a) Let $f(x) = \frac{x^2-4}{x-2}$ for $0 \le x < 2$.

$f(x) = 2$ for $x = 2$

$f(x) = x + 2$ for $x > 2$, discuss the continuity at $x = 2$.

b) Find the value of $\int_2^4 (3x-2)^2 dx$.

c) If θ is in 4th quadrant and $\cos\theta = \frac{5}{13}$ find the value of $\frac{13\sin\theta + 5\sec\theta}{5\tan\theta + 6\,\text{cosec}\,\theta}$. **(4+4+4)**

Unit – III

6. a) Let matrix $A = \begin{bmatrix} 2 & 3 & -1 \\ 3 & 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$, $C = [1 \ -2]$. Verify that (AB)C = A(BC).

b) If $A = \begin{bmatrix} 2 & -3 & 1 \\ 4 & 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -2 & 4 \\ 1 & 3 & -5 \end{bmatrix}$ show that $(A + B)' = A' + B'$. **(6+6)**

7. a) If $A = \begin{bmatrix} 2 & 0 & 4 \\ 6 & 2 & 8 \\ 2 & 4 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 8 & 4 & -2 \\ 0 & -2 & 0 \\ 2 & 2 & 6 \end{bmatrix}$ and $C = \begin{bmatrix} 8 & 2 & 0 \\ 0 & 2 & -6 \\ -8 & 4 & -10 \end{bmatrix}$, then find the value of $3A + 2B - 3C$.

b) Find the adjoint of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$. **(6+6)**

Unit – IV

8. a) Show that the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ satisfies its characteristic equation.

b) Three numbers whose sum is 18 are in AP. If 2, 4, 11 are added respectively, the resulting numbers are in GP. Determine the numbers. **(6+6)**

9. a) Using Cramer's rule, solve the following equation :

$x + y + z = 6$, $x - y + z = 2$, $3x + 2y - 4z = -5$.

b) Compute the inverse of the matrix $A = \begin{bmatrix} 1 & 0 & -4 \\ -2 & 2 & 5 \\ 3 & -1 & 2 \end{bmatrix}$. **(6+6)**