

I Semester B.Sc. Examination, March/April 2022

(CBCS)

Paper – I : MATHEMATICS

Time : 3 Hours

Max. Marks : 70

Instruction : Answer *all* questions.

PART – A

Answer **any five** questions.**(5×2=10)**

1. a) State Cayley-Hamilton theorem.

b) Find eigenvalues of the matrix $\begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$.c) Find the n^{th} derivative of $\frac{1}{3x-1}$.d) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = x^3 + y^3 + 3x^2y$.e) Evaluate $\int_0^{\pi/2} \sin^8 x \, dx$.f) Evaluate $\int_0^{\pi/2} \sin^5 \theta \cos^3 \theta \, d\theta$.g) Find the angle between the line $\frac{x-3}{2} = \frac{y-1}{1} = \frac{z+4}{-2}$ and the plane $x + y + z + 5 = 0$.h) Find the centre and radius of the sphere $x^2 + y^2 + z^2 + 2x - 4y - 6z + 5 = 0$.

PART – B

Answer **one full** question.**(1×15=15)**2. a) Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & -3 & -4 \\ 1 & 3 & 1 & -2 \\ 2 & 5 & 2 & -5 \end{bmatrix}$ by reducing to row reduced Echelon form.b) Verify the system of equations $x + 2y - 5z = -13$, $3x - y + 2z = 1$, $2x - 2y + 3z = 2$, $x - y + z = -1$ for consistency and hence solve.c) Find the eigenvalues and eigenvectors of the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.

OR

P.T.O.