JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

M.Sc-I Semester (BT/MB)

COURSE CODE (CREDITS):20MS1MA111(02) MAX. MARKS: 25

COURSE NAME: Basics of Mathematics and Statistics

COURSE INSTRUCTOR:Dr.Neel Kanth MAX. TIME: 1 Hour 30 Minutes

Note: *(a)All questions are compulsory.*

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

---

Q1.If $A = \begin{bmatrix} 3 & 2 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 5 \end{bmatrix}$,show that $A^2 - 7A + 10I_3$ is a null matrix. [5]

Q2.For two matrices $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & 1 & 0 \end{bmatrix}$ *and* $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \\ 5 & 0 \end{bmatrix}$ verify that $(AB)^T = B^T A^T$ [5]

Q3.Solve the linear system of equations using Cramer's rule [5]

$$x + y + z = 8\,, \qquad 4x + 2y + z = 11 \ \textit{and} \ \ 9x - 3y + z = 6$$

Q4. Simplify and find the result in the form $a + ib$ [4]

a) $\left(\frac{3+2i}{2-3i}\right) + \left(\frac{3-2i}{2+3i}\right)$

b) $\frac{(2+3i)^2}{2-i}$

Q5.Find the least positive value of n, if $\left(\frac{1+i}{1-i}\right)^n = 1$ [2]

Q6.If $z_1 = 2 - i$ *and* $z_2 = 1 + i$, find $\left|\frac{z_1+z_2+1}{z_1-z_2+i}\right|$ [4]