

Question Paper
MS : JAM 2023

Section A: Q.1 – Q.10 Carry ONE mark each.

Q.1 Let $M = \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 1 \end{pmatrix}$. If a non-zero vector $X = (x, y, z)^T \in \mathbb{R}^3$ satisfies $M^6 X = X$, then a subspace of $\mathbb{R}^3$ that contains the vector X is

(A) $\{(x, y, z)^T \in \mathbb{R}^3 : x = 0, y + z = 0\}$

(B) $\{(x, y, z)^T \in \mathbb{R}^3 : y = 0, x + z = 0\}$

(C) $\{(x, y, z)^T \in \mathbb{R}^3 : z = 0, x + y = 0\}$

(D) $\{(x, y, z)^T \in \mathbb{R}^3 : x = 0, y - z = 0\}$

Q.2 Let $M = M_1 M_2$, where M_1 and M_2 are two 3×3 distinct matrices. Consider the following two statements:

(I) The rows of M are linear combinations of rows of M_2 .

(II) The columns of M are linear combinations of columns of M_1 .

Then,

(A) only (I) is TRUE

(B) only (II) is TRUE

(C) both (I) and (II) are TRUE

(D) neither (I) nor (II) is TRUE

Q.3 Let $X \sim F_{6,2}$ and $Y \sim F_{2,6}$. If $P(X \leq 2) = \frac{216}{343}$ and $P\left(Y \leq \frac{1}{2}\right) = \alpha$, then 686α equals

(A) 246

(B) 254

(C) 260

(D) 264

