MM 25 **Matrices** **Time 45 Minutes**

Section A 1 Mark Each

Paper prepared by
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1. If $A = [a_{ij}]$, where $a_{ij} = \begin{cases} i + j, & \text{if } i \geq j \\ i + j, & \text{if } i < j \end{cases}$, construct a 3×2 matrix A.

2. How many orders are possible for a matrix having 15 elements?

3. Are the matrices $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $\begin{pmatrix} 1 & 2 & 0 \\ 3 & 4 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ equal? Give reasons.

Section B 4 Marks Each

4. Represent the matrices $A = \begin{bmatrix} 2 & -1 \\ 4 & 2 \end{bmatrix}$ as a sum of symmetric and a skew-symmetric matrix.

6. Find the values of r and s such that $A^2 + rI = sA$, where $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$.

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7. If $A = \begin{pmatrix} \cos^2\theta & \cos\theta\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{pmatrix}$; $B = \begin{pmatrix} \cos^2\phi & \cos\phi\sin\phi \\ \cos\phi\sin\phi & \sin^2\phi \end{pmatrix}$

Then show that AB is a zero matrix, provided $\theta - \Phi$ is an odd multiple of $\frac{\pi}{2}$

8. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then prove that for $n \in N$, $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}$

Section B 6 Marks Each

9. By using elementary transformations, find the inverse of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$