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**MM 25**

**Matrices**

**Time 45 Minutes**

**Section A 1 Mark Each**

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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  $3 \times 2$  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  $n \in \mathbb{N}$ ,  $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}$

**Section B 6 Marks Each**

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

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