

TEST FOR SELF EVALUATION - 01

Time Allowed : 60 Minutes

Max. Marks : 40

Q01. Construct an order 2 matrix $A = [a_{ij}]$ where $a_{ij} = \frac{(3i-j)^2}{2}$.

Q02. Evaluate: $[a \ b] \begin{bmatrix} c \\ d \end{bmatrix} + [a \ b \ c \ d] \begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix}$. [1×2]

Q03. If a, b, c are in arithmetic progression, prove that $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+4 & x+b \\ x+3 & x+6 & x+c \end{vmatrix} = 0$.

OR Solve: $\begin{vmatrix} 3x-8 & 3 & 3 \\ 3 & 3x-8 & 3 \\ 3 & 3 & 3x-8 \end{vmatrix} = 0$.

Q04. Prove that: $\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$.

Q05. Express the matrix $A = \begin{bmatrix} 4 & 2 & -1 \\ 3 & 5 & 7 \\ 1 & -2 & 1 \end{bmatrix}$ as the sum of symmetric and a skew-symmetric matrix.

Q06. Find the value of p and q such that $A^2 + pI = qA$ where $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$.

Q07. Determine a matrix X such that $2A + B + X = 0$, where $A = \begin{pmatrix} -1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -2 \\ 1 & 5 \end{pmatrix}$. [4×5]

Q08. Find the value of x , $x \in \mathbb{Z}$ such that $\begin{bmatrix} x & 4 & -1 \end{bmatrix} \begin{bmatrix} 2 & 1 & -1 \\ 1 & 0 & 0 \\ 2 & 2 & 4 \end{bmatrix} \begin{bmatrix} x & 4 & -1 \end{bmatrix}' = 0$.

OR Using induction, prove that $A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$, $n \in \mathbb{N}$ if $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$.

Q09. Find A^{-1} , if $A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$. Also show that $A^{-1} = \frac{A^2 - 3I}{2}$.

Q10. Using properties of determinants, prove that: $\begin{vmatrix} -bc & b^2+bc & c^2+bc \\ a^2+ac & -ac & c^2+ac \\ a^2+ab & b^2+ab & -ab \end{vmatrix} = (ab+bc+ca)^3$.

OR Solve: $\frac{2}{a} + \frac{3}{b} + \frac{10}{c} = 4$, $\frac{4}{a} - \frac{6}{b} + \frac{5}{c} = 1$, $\frac{6}{a} + \frac{9}{b} + \frac{20}{c} = 2$. [6×3]

■ ANSWERS

Q01. $\begin{bmatrix} 2 & 1/2 \\ 25/2 & 8 \end{bmatrix}$

Q02. $[ac + bd + a^2 + b^2 + c^2 + d^2]$

Q03. $\frac{2}{3}, \frac{11}{3}$

Q05. $\begin{bmatrix} 4 & 5/2 & 0 \\ 5/2 & 5 & 5/2 \\ 0 & 5/2 & 1 \end{bmatrix} + \begin{bmatrix} 0 & -1/2 & -1 \\ 1/2 & 0 & 9/2 \\ 1 & -9/2 & 0 \end{bmatrix}$

Q06. $p = q = 8$

Q07. $X = \begin{pmatrix} -1 & -2 \\ -7 & -13 \end{pmatrix}$

Q08. $x = -4$

Q09. $\frac{1}{2} \begin{pmatrix} -1 & 1 & 0 \\ 1 & -1 & 1 \\ 0 & 1 & -1 \end{pmatrix}$

Q10. $a = 2, b = 3, c = 5.$

