2504E423

Candidate's Seat No :________

B.Sc. (NEP) Sem.-4 Examination
DSC-M-244
Mathematics
April-2025

Time : 1-00 Hour] **[Max. Marks : 25**

Instructions: (1) **All questions are compulsory.**
(2) **Write the question number in your answer book as shown in the question paper.**
(3) **The figure to the right indicates marks of the question.**

Q-1 (a) For $i \neq j, \alpha \in R$ and if $det: V_n \to R$ is a determinant then prove that 5

$$det(v_1, v_2, \ldots, v_i, \ldots, v_j, \ldots, v_n) = det(v_1, v_2, \ldots, v_i + \alpha v_j, \ldots, v_i, \ldots, v_n)$$

(b) Use Cramer's rule to solve: $3x + y + 2z = 1, x + 2y = 4,\ 10x + 3z = -2.$ 5

OR

Q-1 (a) If $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & -1 & 4 & 5 \\ 2 & 3 & 1 & 4 \\ 1 & 0 & -1 & 3 \end{bmatrix}$ then find det$A$ by applying the Laplace expanstion about the second column of the matrix A. 5

(b) Show that $\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix} = x^2(x + a + b + c)$ 5

Q-2 (a) Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & -1 \\ 2 & -1 & 1 \end{bmatrix}$. 5

(b) Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 2 & -6 & -4 \\ 0 & 2 & 3 \\ 0 & 0 & 1 \end{bmatrix}$. 5

OR

Q-2 (a) Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$. 5

(b) Find inverse of matrix $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & -1 \\ 0 & -1 & 1 \end{bmatrix}$, using Cayley-Hamilton theorem. 5

Q-3 **Answer in brief. (Any Five).** 5

(i) Find $detAB$, if $A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 \\ 0 & -1 \end{bmatrix}$.

(ii) Find $det\,A$, if $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$

(iii) Determinant of Identity matrix of order n is ________ .

(iv) Find charactristic equation of $\begin{bmatrix} 1 & -1 \\ 1 & 2 \end{bmatrix}$.

(v) Find eigen values of $A = \begin{bmatrix} 1 & 0 \\ 3 & 2 \end{bmatrix}$.

(vi) If $\lambda = 2$ is the only eigen value of 2×2 matrix A, then its determinant is ________ .

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