Enrolment No. _____

AHMEDABAD UNIVERSITY

AMRUT MODY SCHOOL OF MANAGEMENT

GRADUATE PROGRAMMES

2024 MONSOON SEMESTER

END SEMESTER EXAMINATION

TOD 504 MATHEMATICS FOR ECONOMICS

Date: 02-12-2024 Total Marks: 90

Time: 08.00 am – 10.00 am No. of printed pages: 02

All questions carry equal marks of 6 each. Answer as many you can. Maximum you can score is 80.

1. If $\mathbf{x} = (x_1, x_2)$ be such that

   1.1 $\mathbf{Q(x)} = 3x_1 - 6x_1x_2 + 3x_2^2$
   1.2 $\mathbf{Q(x)} = 4x_1^2 - 7x_1x_2 - 2x_2^2$

   then find the class of **Q (x)**.

2. If **A** be a diagonal matrix :

   2.1 **A** = diag [1, 2, 3, 4, 5, ….., n]

   2.2 **A** = diag [n, n, n, n, n, ….., n]

   Then what are the eigenvalues of **A?**

3. Let $A = \begin{matrix} 4 & 2 \\ 2 & 1 \end{matrix}$

   3.1 Find the rank of A.

   3.2 Find all eigenvalues and each of its corresponding eigenvectors of A.

4. 4.1 If λ is an eigenvalue of the square matrix A then $\lambda - k$ is an eigenvalue of which matrix?

   4.2 If 5 is an eigenvalue of the square matrix A then 2 is an eigenvalue of which matrix?

   4.3 If λ is an eigenvalue of the square matrix A then what is the eigenvalue of A^m ?

5. 5.1 Can you find the matrix for which the determinant takes the value (a - b)(b - c)(c - a)?

5.2 Find the determinant of

$$\begin{vmatrix} 1 & 2 & 3+4 \\ 1 & 3 & 4+2 \\ 1 & 4 & 2+3 \end{vmatrix}$$

6. Find the matrix **X** from the matrix equation

$$\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} \mathbf{X} = \begin{vmatrix} 3 & 5 \\ 5 & 9 \end{vmatrix}$$

7. Let $A = \begin{vmatrix} 1 & 1 \\ 0 & 1 \end{vmatrix}$

Find A^{19}.

8. Does $f(x) = 3x^2 - 1$ satisfy the conditions of having an extremum in its domain [1, 2] ?

9. Does $f(x) = 1 - x^{2/3}$ over [-1, 1] satisfy the conditions of Roll's Theorem?