Parul University

Faculty of Engineering & Technology

Department of Applied Sciences and Humanities

1st Year B.Tech Programme (All Branches)

Mathematics – 1 (303191101)

Assignment -1

Q-1 Choose the correct option from the below given questions.

1)The linear system of two equations,

$$x + 2y = 7$$

$$-x - 2y = 3$$

possess

a)Infinite solutions	b)No solution
c)A unique solution	d)None of the above

2)The eigen values for the matrix A= $\begin{bmatrix} 1 & 7 & 12 \\ 0 & -1 & -2 \\ 0 & 0 & 3 \end{bmatrix}$ are

a)$1, -1, 3$	b)$1, 0, 0$
c)1,1,2	d) $1, -4, 3$

3)The matrix A= $\begin{bmatrix} 1 & 0 & 1 & -1 & 6 & 0 \\ 0 & 1 & 0 & 7 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$ is in ,

a)Only Row echelon Form	b)Reduced Row echelon form
c)Both	d)Neither of any

4)If eigen values of A = $\begin{bmatrix} -2 & -8 & -12 \\ 1 & 4 & 4 \\ 0 & 0 & 1 \end{bmatrix}$ are 0,1,2 the the eigen values for $A^T is$

a)1,2,2	b)0,1,2
c)$0,1,1/2$	d)1,4,3

5)The coefficient matrix for the quadratic form, $x^2 + y^2 - 2xy$

a)$\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$	b) $\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$
c) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$	d) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$

6)$\frac{\partial f}{\partial x}$ for $f = x^y$ is

a) yx^{y-1}	b)xy^{x-1}
c) x^{y-1}	**d)**none of the above

	7)Rank of matrix 'A' having row echelon form as R= $\begin{bmatrix}1 & 0 & 1 & -1 & 0\\0 & 1 & 0 & 1 & 0\\0 & 0 & 0 & 0 & 0\end{bmatrix}$, is a)1 / b)3 c)2 / d)0
Q-2	Answer the following questions
	1)State Cayley-Hamilton theorem.
	2)How many types of solutions does a homogeneous linear system possess and which are they?
	3)Define free variables and leading variables.
	4)Write names of methods to solve linear system.
	5) Define a modal matrix with its notation.
	6) Write four paths for evaluating limit of a function for two variables.
	7)A 3x3 matrix, say 'B' has rank 3 iff $\|B\|$ is _________
	8)The value class for quadratic form ${x_1}^2 + {x_2}^2$ is _________
	9)Define limit of a function for two variables.
	10)State Euler's theorem for first order for function of two as well as three variables.
Q-3	Solve the following linear systems using Gauss Jordan Elimination method.
	$\begin{aligned} x - 2y - z + 3w &= 1\\ 2x - 4y + z \quad\quad &= 5\\ x - 2y + 2z - 3w &= 4\end{aligned}$
Q-4	Find the rank of a matrix using determinant method A= $\begin{bmatrix}1 & 2 & -1 & -4\\2 & 4 & 3 & 5\\-1 & -2 & 6 & -7\end{bmatrix}$
Q-5	Find rank of a matrix by reducing in row echelon form. A= $\begin{bmatrix}1 & 1 & -1 & 1\\1 & -1 & 2 & -1\\3 & 1 & 0 & 1\end{bmatrix}$
Q-6	Find the eigen values and eigen vectors for A= $\begin{bmatrix}-2 & 2 & -3\\2 & 1 & -6\\-1 & -2 & 0\end{bmatrix}$
Q-7	Find a matrix P that diagonalizes matrix A and determine $P^{-1}AP$ for $A = \begin{bmatrix}-1 & 4 & -2\\-3 & 4 & 0\\-3 & 1 & 3\end{bmatrix}$
Q-8	Discuss the continuity of $f(x, y) = \begin{cases}(2x^2 + y), & (x, y) \neq (1,2)\\ 0 & (x, y) = (1,2)\end{cases}$
Q-9	Check whether the given function is homogeneous or not .If yes then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 4u$ for $u = x^2yz - 4y^2z^2 + 2xz^3$ using Euler's theorem.
Q-10	For $u = x^3y + e^{xy^2}$ show that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$