



DEPARTMENT OF MATHEMATICS

Course: Fundamentals of Linear Algebra, Calculus and Statistics	QUIZ - III	Maximum marks: 10
Course code: MAT211CT	First semester 2023-2024 Chemistry Cycle Branch: AI, BT, CS, CD, CY, IS, SPARK	Time: 20 Minutes Date: 22-01-2024

Name:	Branch:	USN:
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Instructions to students: Rough work can be done at the backside of the sheet.

Q.No	Quiz questions	M	BT	CO
1.1	Rank of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ is ____. Ans: 2	1	L1	1
1.2	For what values of K, the following system has a non-trivial solution $K^2x - y = 0$; $4x - y = 0$. Ans: $K = \pm 2$	1	L1	1
1.3	Eigenvalues of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & -2 \end{bmatrix}$ are ____. Ans: 2,3,-2	1	L1	1
1.4	For the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$, determine the eigenvector corresponding to eigenvalue $\lambda = 1$. Ans: $\begin{bmatrix} -k \\ +k \end{bmatrix}$	1	L1	1
1.5	Express the integral $\int_0^1 \int_y^{\sqrt{y}} f(x,y) dx dy$ as an equivalent integral by changing the order of integration. Ans: $\int_0^1 \int_{x^2}^x f(x,y) dy dx$	2	L2	2
1.6	The integral obtained by transforming $\int_0^1 \int_0^{\sqrt{1-y^2}} f(x,y) dx dy$ to polar coordinates is ____. Ans: $\int_0^{\frac{\pi}{2}} \int_0^1 f(r,\theta) r dr d\theta$	2	L2	2
1.7	If (\bar{x}, \bar{y}) is the center of gravity of the lamina bounded by the region $0 \leq x \leq 1$, $-1 \leq y \leq 3$ with the density function x^3y^2 and mass $\frac{7}{3}$, then \bar{y} is ____. Ans: $\frac{15}{7}$	2	L2	2



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Q.No	Quiz questions	M	BT	CO
1.1	Rank of the matrix $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ is ____. Ans: 3	1	L1	1
1.2	For what values of K, the following system has a non-trivial solution $Kx - 2y = 0; 8x - Ky = 0$. Ans: $K = \pm 4$	1	L1	1
1.3	Eigenvalues of the matrix $\begin{bmatrix} 8 & 0 & 0 \\ 0 & -6 & 0 \\ 3 & 0 & 2 \end{bmatrix}$ are ____. Ans: 8, -6, 2	1	L1	1
1.4	For the square matrix $A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$, determine the eigenvector corresponding to eigenvalue $\lambda = 2$. Ans: $\begin{bmatrix} k \\ 0 \end{bmatrix}$	1	L1	1
1.5	Express the integral $\int_0^1 \int_x^{\sqrt{x}} f(x, y) dy dx$ as an equivalent integral by changing the order of integration. Ans: $\int_0^1 \int_{y^2}^y f(x, y) dx dy$	2	L2	2
1.6	The integral obtained by transforming $\int_{-1}^1 \int_0^{\sqrt{1-x^2}} f(x, y) dy dx$ to polar coordinates is ____. Ans: $\int_0^\pi \int_0^1 f(r, \theta) r dr d\theta$	2	L2	2
1.7	If (\bar{x}, \bar{y}) is the center of gravity of a two dimensional plate that occupies the triangle $0 \leq x \leq 1, 0 \leq y \leq x$ with density function xy and mass $\frac{1}{8}$, then \bar{y} is ____. Ans: $\frac{8}{15}$	2	L2	2



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1.1	Rank of the matrix $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ is _____. Ans: 3	1	L1	1
1.2	For what values of K, the following system has a non-trivial solution $9x - Ky = 0; Kx - y = 0$. Ans: $K = \pm 3$	1	L1	1
1.3	Determine the value of k, if the sum of eigenvalues in matrix $A = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & k \end{bmatrix}$ is 9. Ans: k=2	1	L1	1
1.4	For the square matrix $A = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$, determine the eigenvector corresponding to eigenvalue $\lambda = 2$. Ans: $\begin{bmatrix} -k \\ +k \end{bmatrix}$	1	L1	1
1.5	Express the integral $\int_0^\infty \int_x^\infty f(x, y) dy dx$ as an equivalent integral by changing the order of integration. Ans: $\int_0^\infty \int_0^y f(x, y) dx dy$	2	L2	2
1.6	The integral obtained by transforming $\int_0^2 \int_0^{\sqrt{4-x^2}} (x^2 + y^2) dy dx$ to polar coordinates is _____. Ans: $\int_0^{\pi/2} \int_0^2 r^3 dr d\theta$	2	L2	2
1.7	If (\bar{x}, \bar{y}) is the center of gravity of the region between the curves $y = x^2$ and $y = x$ with the density function x in the interval $0 \leq x \leq 1$ and mass $\frac{1}{12}$, then \bar{x} is _____. Ans: $\frac{3}{5}$	2	L2	2



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Q.No	Quiz questions	M	BT	CO
1.1	Rank of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ is ____. Ans: 2	1	L1	1
1.2	For what values of K, the following system has a non-trivial solution $Kx - y = 0$; $-4x + Ky = 0$. Ans: $K = \pm 2$	1	L1	1
1.3	Determine value of a, if the sum of eigenvalues in matrix $A = \begin{bmatrix} 6 & 0 & 0 \\ 1 & -3 & 0 \\ 0 & 0 & a \end{bmatrix}$ is 9 Ans: a=6	1	L1	1
1.4	For the square matrix $A = \begin{bmatrix} 2 & -5 \\ 0 & 3 \end{bmatrix}$, determine the eigenvectors corresponding to eigenvalue $\lambda = 2$. Ans: $\begin{bmatrix} k \\ 0 \end{bmatrix}$	1	L1	1
1.5	Express the integral $\int_0^\infty \int_y^\infty f(x, y) dx dy$ as an equivalent integral by changing the order of integration. Ans: $\int_0^\infty \int_0^x f(x, y) dy dx$	2	L2	2
1.6	The integral obtained by transforming $\int_{-1}^1 \int_0^{\sqrt{1-x^2}} (x^2 + y^2)^{\frac{3}{2}} dy dx$ to polar coordinates is ____. Ans: $\int_0^\pi \int_0^1 r^4 dr d\theta$	2	L2	2
1.7	If (\bar{x}, \bar{y}) is the center of gravity of a two dimensional plate that occupies the triangle $0 \leq x \leq 1, 0 \leq y \leq x$ with density function xy and mass $\frac{1}{8}$, then \bar{x} is ____. Ans: $\frac{4}{5}$	2	L2	2
