Question Bank	Document No	2-T28 R0
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Subject	Mathematics-I	MATRICES
Subject Code	18BS1MA01	

Sl No	Questions	CO's	Marks
1.	**Find the rank of the following matrix by reducing it to the row echelon form.** **i)** $A=\begin{bmatrix}0 & 2 & 3 & 4\\ 2 & 3 & 5 & 4\\ 4 & 8 & 13 & 12\end{bmatrix}$. **ii)** $A=\begin{bmatrix}-2 & -1 & -3 & -1\\ 1 & 2 & 3 & 1\\ 1 & 0 & 1 & 1\\ 0 & 1 & 1 & 1\end{bmatrix}$ iii) $A=\begin{bmatrix}1 & 2 & 3 & 2\\ 2 & 3 & 5 & 1\\ 1 & 3 & 4 & 5\end{bmatrix}$ Iv) $A=\begin{bmatrix}0 & 1 & -3 & -1\\ 1 & 0 & 1 & 1\\ 3 & 1 & 0 & 2\\ 1 & 1 & -2 & 0\end{bmatrix}$	CO2	5 each
2.	**Test for consistency and solve** i) $x+2y+3z=14$; $4x+5y+7z=35$; $3x+3y+4z=21$ ii) $x-4y+7z=14$; $3x+8y-2z=13$; $7x-8y+26z=5$ iii) $5x_1+x_2+3x_3=20$; $2x_1+5x_2+2x_3=18$; $3x_1+2x_2+x_3=14$	CO2	7 each
3.	**Investigate the values of λ and μ such that the system of equations** $x+y+z=6;\quad x+2y+3z=10;\quad x+2y+\lambda z=\mu$, **may have** **a] Unique solution b] Infinite Solution c] No solution.**	CO2	7
4.	**Solve the following system of equations by Gauss elimination method.** i) $x+y+z=9,\quad x-2y+3z=8,\quad 2x+y-z=3$ ii) $2x+y+4z=12,\quad 4x+11y-z=33,\quad 8x-3y+2z=20$	CO2	5 each

5.	Solve the system of equations by Gauss–Seidel method to obtain the final solution correct to three decimal places i) $x+y+54z=110;\quad 27x+6y-z=85;\quad 6x+15y+2z=72.$ ii) $20x+y-2z=17;\quad 3x+20y-z=-18;\quad 2x-3y+20z=25,$	CO2	5 each
6.	Solve the system of equations by Gauss – Seidel method $5x+2y+z=12;\quad x+4y+2z=15;\quad x+2y+5z=20,$ Carryout 4 iterations taking the initial approximation to the solution as (1, 0, 3).	CO2	5
7.	Find all the Eigen values and the corresponding Eigen vectors of the matrix 1) $\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$ 2) $\begin{bmatrix}-3 & -7 & -5\\ 2 & 4 & 3\\ 1 & 2 & 2\end{bmatrix}$ 3) $\begin{bmatrix}-3 & -7 & -5\\ 2 & 4 & 3\\ 1 & 2 & 2\end{bmatrix}$	CO2	10 each
8.	Reduce the matrix $A=\begin{bmatrix}11 & -4 & -7\\ 7 & -2 & -5\\ 10 & -4 & -6\end{bmatrix}$ into a diagonal matrix. Also find A^5.	CO2	10
9.	Reduce the matrix $A=\begin{bmatrix}-1 & 3\\ -2 & 4\end{bmatrix}$ to the diagonal form and hence find A^4.	CO2	10

10.	**Show that the following matrix is not diagnosable** $A=\begin{bmatrix}2&1&0\\0&2&1\\0&0&2\end{bmatrix}$	CO2	5
11.	**Write the following 3rd order differential equation as a system of first order linear differential equations:** i) $\frac{d^3y}{dt^3}+a_2\frac{d^2y}{dt^2}+a_1\frac{dy}{dt}+a_0y=u(t)$ ii) $\frac{d^4y}{dt^4}+3\frac{d^2y}{dt^2}-\sin t\frac{dy}{dt}+8y=t^2;$ $y(0)=1;\ y'(0)=2;\ y''(0)=3;\ y'''(0)=4;$	CO2	4 each
12.	**Solve the system of homogenous differential equation by diagonalization method** $X'=\begin{pmatrix}-2&-1&8\\0&-3&8\\0&-4&9\end{pmatrix}X$	CO2	7
13	**Solve the system of non-homogenous differential equation by diagonalization method** $X'=\begin{pmatrix}4&2\\2&1\end{pmatrix}X+\begin{pmatrix}3e^t\\e^t\end{pmatrix}$ **and hence discuss the stability of the system**	CO2	10