Code No: P21BST01

R21

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE

(AUTONOMOUS)

I B.TECH I SEMESTER END REGULAR EXAMINATIONS, FEB - 2023

LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS

(CSE(RL))

Time: 3 hours | Max. Marks: 70

Answer all the questions from each UNIT (5X14=70M)

Q.No.		Questions	Marks	CO	KL
UNIT-I					
1.	a)	$A = \begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 2 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ A	[7M]	1	2
		Find the rank of $A = \begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 2 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ by reducing in to Echelon form			
	b)	$3x + 3y - z + 5t = 0,\ 3x - y + 2z - 7t = 0,\ 4x - y - 3z + 6t = 0,\ x - 2y + 4z - 7t = 0$	[7M]	1	3
		Solve $3x + 3y - z + 5t = 0,\ 3x - y + 2z - 7t = 0,$ $4x - y - 3z + 6t = 0,\ x - 2y + 4z - 7t = 0$			
OR					
2.	a)	$A = \begin{bmatrix} 2 & 1 & 3 & -1 \\ 3 & -1 & 2 & 0 \\ 1 & 3 & 4 & -2 \\ 4 & -2 & 1 & 1 \end{bmatrix}$ A	[7M]	1	2
		Find the rank of $A = \begin{bmatrix} 2 & 1 & 3 & -1 \\ 3 & -1 & 2 & 0 \\ 1 & 3 & 4 & -2 \\ 4 & -2 & 1 & 1 \end{bmatrix}$ by reducing into Normal form			
	b)	$x + y + z = 6,\ x + 2y + 3z = 14,\ x + 4y + 7z = 30$	[7M]	1	3
		Show that the equations $x + y + z = 6,\ x + 2y + 3z = 14,\ x + 4y + 7z = 30$ are consistent and solve them.			
UNIT-II					

3.	a)	$A = \begin{bmatrix} 3 & -5 & -4 \\ 5 & -6 & -5 \\ 4 & -5 & 3 \end{bmatrix}$. A Find the Eigen values and the corresponding Eigen vectors of $A = \begin{bmatrix} 3 & -5 & -4 \\ 5 & -6 & -5 \\ 4 & -5 & 3 \end{bmatrix}$.	[7M]	2	2
	b)	- A A^{-1} . $A = \begin{bmatrix} 11 & -6 & 2 \\ 6 & 10 & -4 \\ 2 & -4 & 6 \end{bmatrix}$ Determine A^{-1} if $A = \begin{bmatrix} 11 & -6 & 2 \\ 6 & 10 & -4 \\ 2 & -4 & 6 \end{bmatrix}$ by using Cayley –Hamilton Theorem.	[7M]	2	2
		OR			
4.		$x^2 + 2y^2 + 2z^2 - 2yz + zx - 2xy$. Reduce the Quadratic form $x^2 + 2y^2 + 2z^2 - 2yz + zx - 2xy$ to the Canonical form by Orthogonal relation also find its Nature and Signature	[14M]	2	3
		UNIT-III			
5.	a)	$\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$. Solve $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$	[7M]	3	3
	b)	$y(xy + 2x^2y^2)dx + x(xy - x^2y^2)dy = 0$. Solve $y(xy + 2x^2y^2)dx + x(xy - x^2y^2)dy = 0$	[7M]	3	3

	b)	$x\ y\ 1 \frac{dy}{dx} = 1$. Solve $x\ y\ 1 \frac{dy}{dx} = 1$	[7M]	3	3
		UNIT-IV			
7.	a)	$D^2\ 4\ y = e^x\ \sin 2x\ \cos^2 x$. Solve $D^2\ 4\ y = e^x\ \sin 2x\ \cos^2 x$	[7M]	4	3
	b)	$D^2\ 3D\ 2\ y = \cos 3x \cos 2x$. Solve $D^2\ 3D\ 2\ y = \cos 3x \cos 2x$	[7M]	4	3
		OR			
8.	a)	$(D^2+a^2)\ y = \tan ax$. Solve the Differential equation $(D^2+a^2)\ y = \tan ax$ by the method of variation of parameters.	[7M]	4	3
	b)	$(D^2-6D+13)\ y = 8\ e^{3x}$. Solve $(D^2-6D+13)\ y = 8\ e^{3x}$	[7M]	4	3
		UNIT-V			
9.	a)	L^{-1} { 1 Find $L^{-1}\left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by using convolution theorem	[7M]	5	2
	b)	$\int_0^{\infty} t^3 e^{-t} \sin t\, dt = 0$. Prove that $\int_0^{\infty} t^3 e^{-t} \sin t\, dt = 0$	[7M]	5	3
		OR			
10.		$y''(t)\ 4y'(t)\ 5y(t) = 125t^2, y(0) = y'(0) = 0$ Solve the initial value problem by using Laplace transform $y''(t)\ 4y'(t)\ 5y(t) = 125t^2, y(0) = y'(0) = 0$	[14M]	5	3

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