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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

I B.TECH I SEMESTER END REGULAR EXAMINATIONS, FEB - 2023
LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS
(Common to All Branches)

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) find the rank of $A = \begin{pmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 2 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{pmatrix}$ by reducing in to Echelon form	[7M]	1	2
	b) Solve $3x+3y-z+5t=0, 3x-y+2z-7t=0,$ $4x-y-3z+6t=0, x-2y+4z-7t=0$	[7M]	1	3
OR				
2.	a) Find the rank of $A = \begin{pmatrix} 2 & 1 & 3 & -1 \\ 3 & -1 & 2 & 0 \\ 1 & 3 & 4 & -2 \\ 4 & -2 & 1 & 1 \end{pmatrix}$ by reducing into Normal form	[7M]	1	2
	b) Show that the equations $x+y+z=6, x+2y+3z=14, x+4y+7z=30$ are consistent and solve them.	[7M]	1	3
UNIT-II				
3.	a) Find the Eigen values and the corresponding Eigen vectors of $A = \begin{pmatrix} 3 & -5 & -4 \\ -5 & -6 & -5 \\ -4 & -5 & 3 \end{pmatrix}$.	[7M]	2	2
	b) Determine A^{-1} if $A = \begin{pmatrix} 11 & -6 & 2 \\ -6 & 10 & -4 \\ 2 & -4 & 6 \end{pmatrix}$ by using Cayley –Hamilton Theorem.	[7M]	2	2
OR				
4.	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) 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)	Solve $y(xy + 2x^2y^2)dx + x(xy - x^2y^2)dy = 0$	[7M]	3	3
OR					
6.	a)	Find the orthogonal trajectories of the family of curves $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ where 'a' is the parameter.	[7M]	3	2
	b)	Solve $(x + y + 1)\frac{dy}{dx} = 1$	[7M]	3	3
UNIT-IV					
7.	a)	Solve $(D^2 - 4)y = e^x + \sin 2x + \cos^2 x$	[7M]	4	3
	b)	Solve $(D^2 - 3D + 2)y = \cos 3x \cos 2x$	[7M]	4	3
OR					
8.	a)	Solve the Differential equation $(D^2 + a^2)y = \tan ax$ by the method of variation of parameters	[7M]	4	3
	b)	Solve $(D^2 - 6D + 13)y = 8e^{3x}$	[7M]	4	3
UNIT-V					
9.	a)	Find $L^{-1}\left\{\frac{1}{(s+1)(s^2+1)}\right\}$ by using convolution theorem	[7M]	5	2
	b)	Prove that $\int_0^\infty t^3 e^{-t} \sin t dt = 0$	[7M]	5	3
OR					
10.		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
