Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

First Semester

Power Systems Engineering

PAMPST2411- Applied Mathematics for Power Systems Engineers

Regulations - 2024

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	Infer the Canonical basis for the matrix A=$\begin{bmatrix} 3 & 5 \\ -2 & -4 \end{bmatrix}$.	L2	1	2
2.	Define Least Square Method.	L1	1	2
3.	Define the Dirac delta function in Laplace transform.	L1	2	2
4.	State the Convolution theorem on Laplace transform.	L1	2	2
5.	Recall Periodic function in Fourier trigonometric series	L1	3	2
6.	Interpret whether the function *f(t)=t cost* is even or odd.	L2	3	2
7.	Infer graphically the problem Maximize $z = 3x - 2y$, subject to $x + y \leq 1; 3x + 3y \geq 6; x \geq 0, y \geq 0.$	L2	4	2
8.	Illustrate the initial basic feasible solution to the following transportation problem using North West corner rule.	L2	4	2

To

From						
	3	4	6	8	9	20
	2	10	1	5	8	30
	7	11	20	40	3	15
	2	1	9	14	16	13
	40	6	8	18	6	

9.	Define Lagrange multiplier.	L1	5	2
10.	Outline out the necessary conditions for a maximum or minimum of objective function in non –linear programming problems.	L2	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Illustrate the Cholesky decomposition of A=$\begin{bmatrix} 16 & -3 & 5 & -8 \\ -3 & 16 & -5 & -8 \\ 5 & -5 & 25 & 0 \\ -8 & -8 & 0 & 21 \end{bmatrix}$	L2	1	16

Or

	b	Illustrate the QR decomposition for the matrix A= $\begin{bmatrix} -4 & 2 & 2 \\ 3 & -3 & 3 \\ 6 & 6 & 0 \end{bmatrix}$	L2	1	16
12.	a	State and prove the second shifting property and hence construct the Laplace transform of the function *f(t)*= $\begin{cases} 2, & 0 < t < \pi \\ 0, & \pi < t < 2\pi \\ sint, & t > 2\pi \end{cases}$	L3	2	16
		Or			
	b	An infinitely long string having one end at x=0 is initially at rest on the x-axis. The end x=o undergoes a periodic transverse displacement described by $A_0 sin\omega t\ , t > 0$. Build the displacement of any point on the string at any time *t*.	L3	2	16
13.	a	Examine the average power of the periodic signal (Period J=2) for f(t)= $2cos5\pi t + sin6\pi t$ a) Using a time domain analysis. b) Using a frequency domain analysis.	L4	3	16
		Or			
	b	Examine a generalized Fourier Series expansion of the function: $f(x) = 1, 0 < x < 1$, in terms of the eigen function of $y'' + \lambda y = 0; 0 < x < 1, y(0) = 0, y(1) + y'(1) = 0$	L4	3	16
14.	a	Solve the given LPP using Simplex method. Maximize Z=6x+12y Subject to 3x+4y≤12, 10x+5y≤20, (x, y ≥ 0).	L3	4	16
		Or			
	b	Four different jobs are to be done on four different machines. Table below indicate the cost of producing job i on machine j in rupees. Identify the optimal assignment.	L3	4	16

		m/c			
		1	2	3	4
Job	1	5	7	11	6
	2	8	5	9	6
	3	4	7	10	7
	4	10	4	8	3

15.	a	Infer : Minimize $f(x) = x^2{}_1 + x^2{}_2 + x^2{}_3$ Subject to $g_1(x) = x_1 + x_2 + 3x_3 - 2 = 0$ $g_2(x) = 5x_1 + 2x_2 + x_3 - 5 = 0$	L2	5	16
		Or			
	b	Infer the following non-linear programming problem Maximize $Z = 3.6x - 0.4x^2 + 1.6y - 0.2y^2$ Subject to the constraints : $2x + y \leq 10; x, y \geq 0.$	L2	5	16