

VISWAJYOTHI COLLEGE OF ENGINEERING AND TECHNOLOGY (Autonomous)
FIRST SEMESTER B.TECH DEGREE EXAMINATION DECEMBER 2025 (2025 SCHEME)

Course Code: 25VJGYMAT101

Course Name: MATHEMATICS FOR ELECTRICAL SCIENCE AND PHYSICAL SCIENCE-1

Max. Marks: 60

Duration: 2 Hours 30 Minutes

PART A

<i>Q.No.</i>	<i>Answer all questions. Each question carries 3 marks</i>	<i>CO</i>	<i>Marks</i>
1	If 3 and 15 are eigen values of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$, find the eigen values of A^T and A^2 .	CO1	3
2	Check whether the set of vectors are linearly dependent or not $(1, 2, 3), (0, 1, 2), (-2, 0, 1)$.	CO1	3
3	Show that e^{2x} and e^{-2x} are linearly independent solutions of the differential equation $y'' - 4y = 0$. Find its general solution.	CO2	3
4	Find the Wronskian of e^x and e^{2x} .	CO2	3
5	Find $\mathcal{L}^{-1} \left[e^{-2s} \frac{2}{s^2+4} \right]$.	CO3	3
6	Find $\mathcal{L} (\cos 2t)$.	CO3	3
7	If $f(x)$ is a periodic function with period $2l$ defined in $[-l, l]$, write the Euler's formula for a_0, a_n and b_n .	CO4	3
8	Find Maclaurin's series expansion of $f(x) = \frac{1}{x+1}$.	CO4	3

PART B

Answer any one full question from each module. Each question carries 9 marks

Module 1

9	a. Diagonalize the matrix $\begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$.	CO1	6
	b. Find the rank of the matrix $A = \begin{bmatrix} 0 & 1 & 0 \\ -1 & 0 & -4 \\ 0 & 4 & 0 \end{bmatrix}$.	CO1	3
10	a. Test for consistency and solve the following system of equations $-x + 2y + z = 4, 2x - y + 3z = 8, 3x + y - 4z = 0$.	CO1	6
	b. Find the eigen values of the matrix $\begin{bmatrix} -5 & 2 \\ 0 & -2 \end{bmatrix}$. Also find the eigen values of A^T .	CO1	3

Module 2

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| 11 | <i>Solve $y'' + 2y' + y = \sin x$ by the method of undetermined coefficients.</i> | CO2 | 9 |
| 12 | a. <i>Solve $y'' + 6y' + 9y = 0$.</i> | CO2 | 3 |
| | b. <i>Solve $y'' - 2y' + y = 2e^{-x}$ by the method of undetermined coefficients.</i> | CO2 | 6 |

Module 3

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|----|---|-----|---|
| 13 | a. Find $\mathcal{L}^{-1} \left[\frac{2}{(s-4)^2 + (9)} \right]$. | CO3 | 3 |
| | b. Find $\mathcal{L}^{-1} \left[\frac{s}{s^2 + 5s + 6} \right]$. | CO3 | 6 |
| 14 | a. Using convolution theorem to find $\mathcal{L}^{-1} \left[\frac{18s}{(s^2 + 36)^2} \right]$. | CO3 | 6 |
| | b. Using Laplace transform solve the initial value problem
$y' + 2y = 0, y(0) = 3$ | CO3 | 3 |

Module 4

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| 15 | <i>Find the Fourier sine series of $f(x) = x^2$, $0 < x < \pi$.</i> | CO4 | 9 |
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| 16 | <i>Find the Fourier series of the function</i> | CO4 | 9 |
| | $f(x) = \begin{cases} -\pi, & \text{if } -\pi < x < 0, \\ x, & \text{if } 0 < x < \pi. \end{cases}$ | | |

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