



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-I Winter2024	
Exam Seat No.:	
Academic Year:2024-2025	Semester: III
Class: SY	Program: B.Tech
Branch Code: CHE	Pattern: 2023
Name of Course: Applied Mathematics and Numerical Methods	Course Code:2300201B
Max. Marks:30	Duration: 1:15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 1 page.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.

Marks CO

Question No. 1

- 1 a) Find particular solution (Y_p) of: $(D^2 + 16)y = \sin 4x$ (3) CO1
- 1 b) Solve: $(D^2 + 6D + 9)y = e^{-3x} \sin 2x$ (4) CO2

Question No. 2

- 2 a) Solve: $\frac{d^2 y}{dx^2} + 3\frac{dy}{dx} + 2y = e^{4x}$ (4) CO2
- 2 b) Solve the Cauchy's Differential equation: $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = x^5$ (4) CO2

OR

- 2 c) Solve: $\frac{dx}{y-z} = \frac{dy}{z-x} = \frac{dz}{x-y}$ (4) CO2
- 2 d) Solve the Legendr's Differential equation: $(2x + 1)^2 \frac{d^2 y}{dx^2} - 2(2x + 1) \frac{dy}{dx} - 12y = 6x$ (4) CO2

Question No. 3

- 3 a) A body of weight 3N is suspended from a spring stretches it 15 cm. If the weight is pulled down 10 cm below the equilibrium position and then released, Set up a differential equation. Find the position and velocity as function of time. Find the amplitude, period and frequency of motion. (7) CO4

Question No. 4

- 4 a) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position given by $u(x, 0) = \sin^3(\frac{\pi x}{l})$. If it is released from rest from this position, Evaluate the displacement u at any distance x from one end and at any time t . (8) CO5

OR

- 4 b) Evaluate the solution of one dimensional heat equation: $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ if i) u is finite for all t ii) $u(0, t) = 0; \forall t$ iii) $u(\pi, t) = 0; \forall t$ iv) $u(x, 0) = \pi x - x^2; \text{ for } 0 < x < \pi$ (8) CO5

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