



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:CIV	Pattern:2023
Name of Course:Applied Mathematics & Computational Techniques	Course Code:2300201C
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.
5. Use of non-programmable scientific calculator is allowed.

Marks CO

Question No. 1

- 1 a) Find Particular Integral of $(D^2 + 6D + 5)y = e^{-5x}$ (3) CO2
- 1 b) Solve $\frac{d^3y}{dx^3} + \frac{dy}{dx} = \cos x$ (4) CO2

Question No. 2

- 2 a) Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = x^4 e^{2x}$ (4) CO2
- 2 b) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = x \log x$ (4) CO2

OR

- 2 c) Solve $\frac{dx}{y^2-z} = \frac{dy}{z-x} = \frac{dz}{x-y}$ (4) CO2
- 2 d) Solve $(x+2)^2 \frac{d^2y}{dx^2} + 3(x+2) \frac{dy}{dx} + y = 4 \sin(\log(x+2))$ (4) CO2

Question No. 3

- 3 a) The differential equation of a horizontal, simply supported uniform beam of length l bends under its own weight, which is w kg per foot is $EI \frac{d^2y}{dx^2} = \frac{wx^2}{2} - \frac{wlx}{2}$. Find the equation for deflection of beam. (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 $y(x, 0) = y_0 \sin^3 \frac{\pi x}{l}$. If it is released from rest from this position, find the displacement y at any distance x from one end and at any time t using the wave equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ (8) CO5

OR

- 4 b) Solve the equation $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$ where $u(x, t)$ satisfies the following conditions: (8) CO5
- (i) $u(0, t) = 0$ for all t , (ii) $u(l, t) = 0$ for all t , (iii) $u(x, 0) = x$ in $0 < x < l$,
(iv) $u(x, \infty)$ is finite

..... End of question paper.....