



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

	InSem Examination-I Winter 2023		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: III	
	Name of Programme: Chemical Engineering	Pattern: 2022	
	Name of Course: Applied Mathematics-III	Course Code: SMH222201	
	Max. Marks: 30	Duration: 01 Hour	

	<p>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.</p> <ol style="list-style-type: none">1. This question paper contains 02 page(s).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. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question	
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Question No. 1 Attempt following Question

a) Find general solution of $(D^2-9)y = e^{3x} + 1$ (5) CO2

OR

b) Find general solution of $(D^2-4D+4)y = e^{2x}\sin 3x$ (5) CO2

c) Solve $(D^2+4)y = x^3 - 2x^2 + 3$ (5) CO2

OR

d) Solve $x^3 \frac{d^2y}{dx^2} + 3x^2 \frac{dy}{dx} + xy = \sin(\log x)$ (5) CO2

e) Solve by method of variation of parameter
 $(D^2+2D+1)y = e^{-x}\log x$ (5) CO2

OR

f) Solve: $\frac{dx}{y} = \frac{dy}{-x} = \frac{dz}{2x-3y}$ (5) CO2

Question No. 2 Attempt following Question

- a) Solve $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$; where $u(x, t)$ satisfies the following conditions, (7) CO2
- (i) $u(0, t) = 0; \forall t$ (ii) $u(L, t) = 0; \forall t$
(iii) $u(x, 0) = x, \text{ for } 0 < x < L$ (iv) $u(x, \infty)$ is finite; $\forall x$

OR

- b) An infinitely long plane uniform plate is bounded by two parallel edges in the y-direction and an end at right angles to them. The breadth of the plate is π . This end is maintained at temperature u_0 at all points and other edges at zero temperature. Find the steady state temperature function $u(x, y)$. (7) CO2
- c) A string is stretched and fastened to two points l apart. Motion is started by displacing the string in the form $u = a \sin \frac{\pi x}{l}$ from which it is released at time $t=0$. Find the displacement $u(x, t)$ from one end. (Use wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$) (8) CO2

OR

- d) Solve the equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ represents the vibrations of a string of length l fixed at both ends, find solution with boundary conditions, (8) CO2
1. $y(0, t) = 0$ 2. $y(l, t) = 0$
3. $(\frac{\partial y}{\partial t})_{t=0} = 0$ 4. $y(x, 0) = k(lx - x^2), 0 \leq x \leq l$