



Solve the Following Questions

(Question Number-1) :(15 Marks)

(A) Solve the differential equation $y' - 5y = \frac{-5}{2}xy^3$

(B) Solve the differential equation $y' = \frac{ax + 2y - 3}{2x + y - 3}$ in the two cases $\boxed{1}$ $a = 1$ $\boxed{2}$ $a = 4$

(Question Number-2) :(15 Marks)

(A) Solve the differential equation $p^2 - 2xp + y = 0$.

(B) Solve the DEs. $\boxed{1}$ $(2xy - \sec^2 x)dx + (x^2 + 2y)dy = 0$ $\boxed{2}$ $y \frac{d^2y}{dx^2} + 1 = \left(\frac{dy}{dx}\right)^2$

(Question Number-3) :(20 Marks)

Find the total solution of the following differential equations:

$\boxed{1}$ $(D^2 + 3D + 2)y = e^{2x} \sin x$ $\boxed{2}$ $(x^2D^2 + xD)y = 12 \ln x$

(B) Solve the system $\frac{dx}{dt} = 3x - 2y$ $\frac{dy}{dt} = 2x - y$

(C) Evaluate the moment of inertia about y-axis of a thin plate bounded by the parabola $y = 6x - x^2$ and the straight line $y = x$.

(Question Number-4) :(25 Marks)

(A) Find Laplace transform of $\boxed{1}$ $\int_0^t \frac{\sin t}{t} dt$, $\boxed{2}$ $e^{2t} \cos(2t)$

(B) Find the inverse Laplace transform of $\boxed{1}$ $F(s) = \frac{s-3}{s^2-4s-4}$ $\boxed{2}$ $F(s) = \ln \frac{s+1}{s-1}$

(C) Solve the differential equation $y'' - 3y' + 2y = 4e^{2x}$ using the Laplace transform method with the initial conditions $y(0) = 0$, $y'(0) = 1$.

(Question Number-5) :(25 Marks)

(A) Test the convergence of the following series

$\boxed{1}$ $S_n = \sum \frac{n!}{3^n}$ $\boxed{2}$ $S_n = \sum_{n=1}^{\infty} \frac{1}{(n+1) \ln(n+1)}$ $\boxed{3}$ $S_n = \sum \left(\frac{n}{2n+1}\right)^n$

(B) Find the interval of convergence of the series $S_n = \sum \frac{(x-2)^2}{n}$

(C) Find the Fourier series of the function: $f(x) = \begin{cases} 5 & 0 < x < \pi \\ -5 & -\pi < x < 0 \end{cases}$

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This exam contributes " by measuring in achieving Programme Academic Standards according to NARS								
Question Number	Q1-A-Q3-A,B	Q3-C	Q4-A,B	Q5-A,B	Q5-C	Q2	Q4-C	Q1-B
Skills	a-1-2	a-1-4	a-5-1	a-5-2	a-5-3	b-3-1	b-3-3	c-1-1
	Knowledge & Understanding Skills				Intellectual Skills		Professional Skills	