

DA questions

1.

(a). Solve: $(x^2 D^2 + xD - g)y = x^2 \log x$.

(b). Solve: $(x^2 D^2 + 3xD + 5)y = x \log(\cos x)$.

(c). Solve: $(x^2 D^2 + 4xD + 2)y = x + \frac{1}{x}$.

2.

(a). Solve by variation of parameters: $\frac{d^2 y}{dx^2} + y = \sec^2 x$.

(b). Form the PDE by eliminating arbitrary function: $z = xy + f(x^2 + y^2)$.

3.

(a). Solve $\frac{d^2 y}{dx^2} - y = \frac{2}{1+e^x}$ by method of variation of parameter.

(b). Solve: $p^2 + pq = z^2$.

4.

Form PDE by eliminating: (a). Arbitrary function 'f' from: $f(z - xy, x^2 + y^2) = 0$.

(b). Solve: $z = px + qy + (\frac{q}{p} - p)$.

5.

(a). $x(z^2 - y^2)p + y(x^2 - z^2)q = z[y^2 - x^2]$.

(b). Solve: $(x^2 D^2 - 8xD + 20)y = \sin(\log x) + x$.

6.

(a). Solve using variations of parameters: $\frac{d^2 y}{dx^2} - 12\frac{dy}{dx} + 32y = x + e^x$.

(b). Solve $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$.

7.

Express in terms of unit step function and find laplace transforms

(i). $f(t) = \begin{cases} \cos t, & 0 < t < \pi, \\ 0, & t > \pi \end{cases}$.

(ii). $f(t) = \begin{cases} 1, & 0 < t < 2, \\ 0, & 2 < t < 3, \\ e^t, & t > 3 \end{cases}$.

8. Find inverse laplace transform of: (i). $\frac{1}{s^2(s+1)^2}$ using convolution theorem.

9. Find the inverse of $\frac{1}{(s+1)^2(s^2+4)}$.

10. Find laplace transform of following periodic function: $f(t) = \begin{cases} e^t, & 0 < t < 1, \\ 1, & 1 < t < 2 \end{cases}$ with period 2.