**MAY 2024** **U/ID 32510/UCM4A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. Define final value theorem.

2. Write the disadvantage of laplace transform method.

3. Find Laplace Transform of $\sin^2 t$ .

4. Give an example of an inverse transform.

5. How do you use convolution theorem?

6. Define shifting property.

7. What is periodic function?

8. What is Fourier expansion of odd function?

9. What are the types of fourier transform?

10. State the Parseval's formula or identity.

11. How to differentiate first order and second order differential equation?

12. What are examples of 1st order differential equations?

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Prove that $L\left[e^{-at}\right]=1/(s+a)$ where $s+a>0$ or $s>-a$.

14. Using the Laplace transform find the solution for the following equation $\frac{\partial^2 y(t)}{\partial t^2}=2\frac{\partial y(t)}{\partial t}+y(t)$ with initial conditions $y(0)=3, Dy(0)=6$.

15. Compute the inverse Laplace transform of $Y(s)=2/3s^4$.

16. Find the Inverse Laplace transformation of $F(s)=1/s(s+1)(s+2.)$

17. Find a Fourier series to represent $f(x)=\pi-x,$ for $0<x<2\pi$.

18. Find the Fourier Cosine Transform of $e^{-ax}$, $a>0$.

19. Write the steps to solve linear differential equation.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. Find $L(t^2 e^{-t}.\cos t)$.

21. Find the inverse laplace transform of $F(s) = 6 + (s+1)(s^2 - 5s + 11)/s(s-1)(s-2)(s+1)$.

22. Find the sine and cosine half -range series for the function $f(x) = x$, $0 < x \le \pi/2 = \pi - x, \le x < \pi\pi/2$.

23. Find the Fourier cosine transform of $e^{-a2\,x2}$.

24. Express the differential equation in Laplace transformation form $\frac{d^2x}{dt^2} + 6\frac{dx}{dt} + 8x = 0$ given $x(0^+) = 0$ and $x'(0^+) = 2$.

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