LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **MATHEMATICS**

THIRD SEMESTER – **JUNE 2015**

MT 3504 - INTEGRAL TRANSFORMS & PARTIAL DIFF. EQUATIONS

Date : 03/07/2015   Dept. No. [   ]   Max. : 100 Marks
Time : 10:00-01:00

Part – A (10 X 2 = 20)

Answer ALL the questions:

1. State Lagrange's equation.
2. Eliminate the arbitrary constants and form the partial differential equation in $z = (x + a)(y + b)$.
3. Define Laplace transform.
4. State the initial value theorem.
5. Find the inverse of Laplace transform of $1/(s + 2)^2$.
6. Write down the values of $L(y')$ and $L(y'')$.
7. What is the complex form of the Fourier integral?
8. Evaluate $L[t^2 + t + 3]$.
9. Define Fourier sine transform.
10. State Convolution theorem.

Part – B (5 X 8 = 40)

Answer any FIVE questions:

11. Solve $x^2 p + y^2 q = z^2$.
12. Solve: $p^2 - xp - q = 0$.
13. Find Laplace transform of $\dfrac{(\cos 3t - \cos 2t)}{t}$.
14. Find $L[f(t)]$ where $f(t) = \begin{cases} 0, & 0 < t < 2 \\ 3, & t > 2 \end{cases}$.
15. Find $L^{-1}\left(\dfrac{s + 2}{(s - 4)(s^2 + 1)}\right)$
16. Find $L^{-1}\left(\dfrac{s - 1}{2s^2 + s + 6}\right)$
17. Find the Fourier cosine transform of $\dfrac{e^{-ax}}{x}$.
18. Find the Fourier cosine and sine transform of $\dfrac{1}{\sqrt{x}}$

Part – C (2 X 20 = 40)

Answer any TWO questions:

19. (a) Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$.
    (b) Find the complete and singular solution of $z = xp + yq + p^2 - q^2$.

20. Solve using Laplace transform $\dfrac{d^2 y}{dt^2} - 4\dfrac{dy}{dt} + 5y = 4e^{3t}$ given y(0) = 2, y'(0) = 7.

21. (a) State and prove Parseval's identity.
    (b) State and prove Complex form of Fourier integral.

22. (a) State and prove the linearity property of Fourier transforms.
    (b) State and prove the change of scale property of Fourier cosine and sine transforms.

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