LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **APRIL 2019**

16/17UMT3MC01– INTEGRAL TRANSFORMS AND PARTIAL DIFF. EQUATIONS

Date: 24-04-2019 Dept. No. Max. : 100 Marks
Time: 01:00-04:00

Part – A (10 x 2 =20 marks)

Answer all questions :

1) Find $L\,[t^2 + 2t + 3]$.
2) Find $L\,[te^{-at}]$.
3) Find $L^{-1}\left[\frac{1}{(s+2)^2+16}\right]$.
4) Find $L^{-1}\left[\frac{s}{s^2+k^2}\right]$.
5) State the linearity property of Fourier transform.
6) Prove that $F[f(ax)] = \frac{1}{a}\,F\left[\frac{s}{a}\right]$.
7) Define Fourier Cosine transform.
8) Find $F_s\,[e^{-ax}]$.
9) Form partial differential equation by eliminating the constants a and b from z = ax + by + a.
10) Solve $\frac{\partial^2 z}{\partial y^2} = \sin y$.

Section – B (5x8=40 Marks)

Answer any five questions :

11) Find $L\left[\frac{Cos\,3t - Cos\,2t}{t}\right]$.
12) Find $L\,[f\,(t)]$ where $f\,(t) = 0$ when $0 < t \leq 2$
    $= 3$ when $t > 2$
13) Find $L^{-1}\left[\frac{s^2}{(s-1)^3}\right]$.
14) Find $L^{-1}\left[\frac{s-3}{s^2+4s+13}\right]$.
15) State and prove convolution theorem.
16) Show that $F_c\left[\frac{1}{\sqrt{x}}\right] = \frac{1}{\sqrt{s}}$.
17) Form a partial differential equation by eliminating function from lx + my + nz = $f(x^2+y^2+z^2)$.
18) Solve $p(1 + q^2) = q(z - 1)$.

Section – C (2 x 20 = 40 Marks)

Answer any two questions :

19) a) Find $L^{-1}\left[\frac{1}{s\,(s+1)(s+2)}\right]$.

b) Evaluate $\int_0^{\infty} te^{-3t} cost\, dt.$ **(10 +10)**

20) Solve $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = sint$ given that $y = \frac{dy}{dt} = 0$ when t = 0.

21) Find the Cosine transform for F(x) if f (x) =1 when |x| < 1

=0 when |x| >1

Deduce that (i) $\int_0^{\infty} \frac{sint}{t}\, dt = \frac{\pi}{2}$ (ii) $\int_0^{\infty} (\frac{sint}{t})^2\, dt = \frac{\pi}{2}$

22) a) Solve (y + z)p + (z + x)q = x + y.

b) Solve $p^2 + q^2 = npq$. **(10 + 10)**

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