



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – MATHEMATICS

THIRD SEMESTER – NOVEMBER 2017

MT 3504 – INTEGRAL TRANSFORMS & PARTIAL DIFF. EQUATIONS

Date: 07-11-2017

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART – A

ANSWER ALL THE QUESTIONS

(10 x 2 = 20)

1. Eliminate a and b from $z = (x+a)(y+b)$.

2. Solve $x + y \frac{\partial z}{\partial x} = 0$.

3. Find $L(t^3 - 3t^2 + 2)$

4. Find $L(\cos^2 3t)$.

5. Find $L^{-1}\left(\frac{s}{(s+2)^2}\right)$.

6. Find $L^{-1}\left(\frac{1}{s(s+a)}\right)$.

7. Prove that $F\{f(x-a)\} = e^{ias} F(S)$.

8. Prove that $F\{F(x)\} = f(-s)$.

9. Show that $F_c\{f(ax)\} = \frac{1}{a} F_c\left(\frac{S}{a}\right)$.

10. Prove that $F_s[F_s(x)] = f(S)$.

PART – B

ANSWER ANY FIVE QUESTIONS

(5 x 8 = 40)

11. Solve $p(1+q^2) = q(z-1)$.

12. Solve $q = xp + p^2$.

13. Find $L\left(\frac{\sin^2 t}{t}\right)$.

14. Evaluate $L\left(\frac{\cos 2t - \cos 3t}{t}\right)$.

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

16. Find $L^{-1}\left[\frac{s-3}{s^2+4s+13}\right]$.

17. Show that $F\{x^n f(x)\} = (-i)^n \frac{d^n}{ds^n} F\{f(x)\}$.

18. Show that $F_c\left\{\frac{1}{\sqrt{x}}\right\} = F_s\left\{\frac{1}{\sqrt{x}}\right\} = \frac{1}{\sqrt{s}}$.

PART – C

ANSWER ANY TWO QUESTIONS

(2x 20 = 40)

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

(b) Solve $p^2 + q^2 - 2px - 2qy + 1 = 0$. **(10+10)**

20. Using Laplace transform, solve the equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$ given that $y = \frac{dy}{dt} = 0$

when $t=0$.

21.(a) Find the Laplace transforms of $f(t) = \begin{cases} t & 0 < t < b \\ 2b-t & b < t < 2b \end{cases}$

(b) State and prove complex form of Fourier integral formula. **(10+10)**

22. (a) Prove that $F_c\{f''(x)\} = -\sqrt{\frac{2}{f}}f'(0) - s^2F_s(s)$

(b) State and prove convolution theorem. **(10+10)**
