



Date: 07-05-2018
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

PART – A

ANSWER ALL THE QUESTIONS:

(10 x 2 = 20)

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

2. Solve $\frac{\partial^2 z}{\partial y^2} = \sin y$.

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

4. Find $L(t^2 e^{-3t})$.

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 $F\{e^{iax} f(x)\} = F(s+a)$.

9. Prove that $F_s[F_s(x)] = f(s)$.

10. Find $F_c(e^{-ax})$.

PART – B

ANSWER ANY FIVE QUESTIONS:

(5 x 8 = 40)

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

12. Solve $z^4 q^2 - z^2 p = 1$.

13. Find $L(te^{-t} \sin t)$

14. Evaluate $\int_0^{\infty} \frac{e^{-t} - e^{-2t}}{t} dt$.

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

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

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 $z = px + qy + \sqrt{1 + p^2 + q^2}$.

(b) Solve $(y^2 + z^2)p - xyq = -xz$.

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) Using Laplace transforms, evaluate $\int_0^{\infty} \frac{\cos tx}{1+x^2} dx$.

(b) State and prove complex form of Fourier integral theorem.

22. (a) Find the Fourier Cosine transform for $f(x)$ if $f(x) = \begin{cases} 1, & \text{when } |x| < 1 \\ 0, & \text{when } |x| > 1 \end{cases}$. Deduce that

(i) $\int_0^{\infty} \frac{\sin t}{t} dt = \frac{\pi}{2}$. (ii) $\int_0^{\infty} \left(\frac{\sin t}{t} \right)^2 dt = \frac{\pi}{2}$.

(b) Find $F_C \left\{ \frac{1}{1+x^2} \right\}$.
