



Date: 29-10-2018
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

PART – A

ANSWER ALL THE QUESTIONS:

(10 x 2 = 20)

1. Eliminate the arbitrary constants from $z = ax + by$.

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

3. Find $L(\sin 2t)$.

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

5. Find $L^{-1}\left(\frac{s-3}{(s-3)^2+4}\right)$

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

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

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

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 $q = xp + p^2$

12. Solve $p^2 + q^2 = x^2 + y^2$

13. Find $L\left(\frac{1-e^t}{t}\right)$.

14. Evaluate $\int_0^\infty e^{-2t} \sin 3tdt$.

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

16. Find $L^{-1}\left[\frac{s+2}{(s^2+4s+5)^2}\right]$.

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 $pxy + pq + qy = yz$

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

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) State and prove Convolution theorem.

(b) State and prove Parseval's 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) Solve the integral equation $\frac{1}{2} \int_0^\infty f(t) e^{-|x-t|} dt = h(x)$, where $h(x)$ is a given function.
