Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1	Write sufficient conditions for the existence of the Laplace Transform of a function.	2	1	1	1,12
2.	Compute $L(2e^{3t} + \cos t)$	2	2	1	1,12
3.	Define Even and Odd functions.	2	1	2	1,12
4.	Write any two Dirichlet's conditions for a Fourier expansion.	2	1	2	1,12
5.	Define Fourier sine transform and Inverse Fourier sine transform.	2	1	3	1,12
6.	State and prove Change of scale property of Fourier transform.	2	1	3	1,12
7.	Form the partial differential equation by eliminating a, b from $z = (x + a)(y + b)$.	2	1	4	1,12
8.	Solve $px + qy = z$.	2	2	4	1,12
9.	Write one dimensional heat and wave equations.	2	1	5	1,12
10.	Solve $\frac{\partial u}{\partial x} = \frac{\partial u}{\partial y}$ by the method of separation of variables.	2	1	5	1,12

Part-B (5×8 = 40 Marks)

11. a)	Find $L(te^{3t} \sin 2t)$	3	2	1	1,12
b)	Using Convolution theorem, find $L^{-1}\left[\frac{1}{S(S^2+4)}\right]$	5	3	1	1,12
12. a)	Find the Half-Range Fourier Sine Series of $f(x) = x, 0 < x < 2$.	3	2	2	1,12
b)	Obtain the Fourier series to represent the function $f(x) = \|x\|$ in $-\pi < x < \pi$ and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$	5	3	2	1,12
13. a)	Find the Fourier Sine Transform of $\frac{1}{x}$	4	3	3	1,12
b)	Find the Fourier Transform of $f(x) = \begin{cases} 1 - x^2, & \|x\| \leq 1 \\ 0, & \|x\| > 1 \end{cases}$ i.e $-1 \leq x \leq 1$.	4	2	3	1,12

		M	L	CO	PO
14. a)	Solve $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$.	4	2	4	1,12
b)	Find the general solution of the partial differential equation $p^3 + q^3 = 3pqz$.	4	2	4	1,12
15.	Solve $\dfrac{\partial u}{\partial t} = c^2 \dfrac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(0,t) = 0, u(l,t) = 0$ & $u(x,0) = \sin\dfrac{\pi x}{l}$	8	3	5	1,12
16. a)	Using Laplace Transform method, Solve the differential equation $(D^2 + 3D + 2)y = e^{-t}$, $y(0) = 0, y'(0) = 1.$	4	3	1	1,12
b)	Expand $f(x) = \begin{cases} \pi x, & 0 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$ into a Fourier Series.	4	2	2	1,12
17.	Answer any *two* of the following:				
a)	Find the Fourier Cosine Transform of $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x \geq a \end{cases}$	4	3	3	1,12
b)	Find the general and singular solutions of $z = px + qy + p^2 - q^2$.	4	3	4	1,12
c)	Solve $4\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} = 3u$; $u(0,y) = e^{-5y}$ by the method of separation of variables.	4	2	5	1,12

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	22%
ii)	Blooms Taxonomy Level – 2	37%
iii)	Blooms Taxonomy Level – 3 & 4	41%

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