Code No: **21BS2101** **RM-21** SET :03

II B.Tech I Semester Regular Examinations February-2023

TRANSFORM TECHNIQUES

(Branches : Common to all Branches)

Time :3 hours Max.Marks:70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

UNIT -I

1 A) *Evaluate* $L(e^{-2t}\sin^2 2t\,dt)$ 7M

B) *Using laplace transform solve* $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=e^{-t}\sin t$ *given that* $y(0)=0, y^1(0)=1.$ 7M

OR

2 A) Find $L^{-1}\left\{\frac{2s^2-6s+5}{s^3-6s^2+11s-6}\right\}.$ 7M

B) *Using Convolution theorem find* $L^{-1}\left\{\frac{1}{s(s^2+2s+2)}\right\}$ 7M

UNIT -II

3 A) Find the Fourier Series to represent $f(x)=x^2$ in the interval$(0, 2\prod)$ 7M

B) Find Half range consine Series of f(x)=x, 0<x<2 7M

OR

4 A) *Find the Fourier series to represent* $\sqrt{1-\cos x}$ *in the interval* $-\pi \le x \le \pi.$ 7M

B) *Express* $f(x)=\begin{cases}1+\frac{2x}{\pi}, & -\pi < x \le 0\\ 1-\frac{2x}{\pi}, & 0 \le x \le \pi\end{cases}$ *as a Fourier Series deduce that* $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+\ldots\ldots=\frac{\pi^2}{8}$ 7M

UNIT -III

5 A) *Using fourier integral show that* $e^{-ax}=\frac{2a}{\pi}\int_0^\infty \frac{\cos\lambda x}{\lambda^2+a^2}\,d\lambda \quad ,(a>0, x\ge 0)$ 7M

B) Find Fourier Sine and cosine transforms of f(x). 7M
f(x)=1 if 0<x<a and f(x)=0 if x>a

OR

6 A) Using Fourier integral , Show that $e^{-ax}-e^{-bx}=\frac{2(b^2-a^2)}{\pi}\int_0^\infty \frac{\lambda\sin\lambda x}{(\lambda^2+a^2)(\lambda^2+b^2)}\,d\lambda.$ 7M

B) Obtain the Fourier expansion of $f(x)=x\sin x$ as a cosine series in $(0,\pi)$. 7M

UNIT -IV

7 A) Form the partial differential equation by eliminating the arbitrary Function from the following. 7M

$$Z = xy + f(x^2 + y^2 + z^2)$$

B) Solve the Partial Differential Equation 7M

$$p\sqrt{x} + q\sqrt{y} = \sqrt{z}$$

OR

8 A) Form the partial differential equation by eliminating the arbitrary Constants from the following. 7M

1) $Z = ax + by + a^2 + b^2$

2) $Z = ax^3 + by^3$

B) 1) Solve $p\,tanx + q\,tany = \tan z$ 7M

2) Solve $p^2 + q^2 = npq$

UNIT -V

9 A) 7M

Solve $\dfrac{\partial^3 z}{\partial x^3} - 2\dfrac{\partial^3 z}{\partial x^2 \partial y} = 2e^{2x} + 3x^2 y$.

B) 7M

Solve $\dfrac{\partial^2 z}{\partial x^2} + 4\dfrac{\partial^2 z}{\partial x \partial y} - 5\dfrac{\partial^2 z}{\partial y^2} = \sin(2x + 3y)$.

OR

10 A) 7M

solve $\dfrac{\partial u}{\partial x} = 4\dfrac{\partial u}{\partial y}$ where $u(0, y) = 8e^{-3y}$ by the method of separation of variables.

B) 7M

Solve $(D^3 - 4D^2D' + 4DD'^2)z = 2\sin(3x + 2y)$