5. Attempt any <u>two</u> parts of the following: 10×2=20

(a) Find Fourier sine series for the function $f(x)=e^{ax}$ for $0<x<\pi$ where a is constant.

(b) Solve using Laplace transform method $y''+4y'+4y=6e^{-t}$, given that $y(0)=-2$, $y'(0)=8$.

(c) A particle falls under gravity in a resisting medium whose resistance varies with velocity. Find the relations between distance and velocity if initially the particle starts from rest.

—x—

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NBC201

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 194401

Roll No.

M.C.A. (Dual Degree) (Semester-II)

SPL. THEORY EXAMINATION, 2014-15

MATHEMATICS-II

Time : 3 Hours] *[Total Marks : 100*

Note: Attempt <u>all</u> questions.

1. Attempt any <u>four</u> parts of the following: 5x4=20

(a) $x\frac{dy}{dx}+\cot y=0$, $y=\frac{\pi}{4}$ at $x=\sqrt{2}$.

(b) Solve:

$$\left(D^2-3D+2\right)y=e^{3x}$$

(c) If $L\left\{J_0\left(\sqrt{t}\right)\right\}=\frac{e^{\frac{-1}{4S}}}{S}$. Find $L\left\{J_0\left(2\sqrt{t}\right)\right\}$.

(d) Find:

$$L^{-1}\left(\frac{S+1}{S^2-6S+25}\right)$$

(e) Solve:

$$\frac{\partial^4 z}{\partial x^4}-2\frac{\partial^4 z}{\partial x^3 \partial y}+2.\frac{\partial^4 z}{\partial x.\partial y^3}-\frac{\partial^4 z}{\partial y^4}=0$$

(f) Find particular integral if:

$$\left(D^2-DD'-2D'^2+2D+2D'\right)Z=\sin(2x+y)$$

2. Attempt any <u>two</u> parts of the following: 10x2=20

(a) Solve:

$$\frac{dy}{dx}=\frac{x(2\log x+1)}{\sin y+y\cos y}$$

(b) Solve:

$$\left(D^3-3D^2+4D-2\right)y=e^x+\cos x$$

(c) Solve the equation in series about $x=0$.

$$2x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-(x+1)y=0$$

3. Attempt any <u>two</u> parts of the following: 10x2=20

(a) Express J_5 in term of J_1 and J_2.

(b) Show that:

$$\frac{d}{dx}\left(J_n^2+J_{n+1}^2\right)=2\left(\frac{n}{x}J_n^2-\frac{n+1}{x}J_{n+1}^2\right)$$

(c) Evaluate:

$$\int_0^\infty \frac{e^{-at}-e^{-bt}}{t}\cdot dt$$

4. Attempt any <u>two</u> parts of the following: 10x2=20

(a) Find Laplace transform of periodic function:

$$f(t)=\begin{cases} t & \text{for } 0<t\le a \\ 2a-t & \text{for } a<t<2a \end{cases}$$

(b) By using convolution theorem find:

$$L^{-1}\left\{\frac{P^2}{\left(P^2+a^2\right)\left(P^2+b^2\right)}\right\},\quad a\neq b$$

(c) Find the Fourier series for:

$$f(x)=x,\quad 0<x<2\pi$$