Code No: R13102 **R13** SET - 1

I B. Tech I Semester Supplementary Examinations, May/June - 2019

MATHEMATICS-I

(Com. to All branches)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Find the orthogonal trajectories of the family of straight lines in a plane and passing through the origin. (4M)

b) Solve the D E $\frac{d^3y}{dx^3}+2\frac{d^2y}{dx^2}-\frac{dy}{dx}-2y=0$ (3M)

c) If $L\{f(t)\}=log\left(\frac{s+3}{s+1}\right)$ then find $L\{f(2t)\}$ using change of scale property. (4M)

d) If $f(x,y)=\log\frac{x^2+y^2}{xy}$ then show that $\frac{\partial^2 f}{\partial x\partial y}=\frac{\partial^2 f}{\partial y\partial x}$ (3M)

e) From the PDE by eliminating arbitrary constants $z = f(x + y + z, x^2 + y^2 + z^2)$. (4M)

f) Solve the PDE $\left(D^3-7DD^{1^2}-6D^{1^3}\right)z=0$ (4M)

PART -B

2. a) Solve the D.E $x\frac{dy}{dx}+y=x^3y^6$ (8M)

b) A body is kept in air with temperature 25^0C cools from 140^0C to 80^0C in 20 minutes. Find when body cools down to 35^0C (8M)

3. a) Solve the D.E $y^{11}+4y^1+5y=-2\cosh x$, $y(0)=0$, $y^1(0)=1$ (8M)

b) Solve the D.E $\left(D^2+9\right)y=x.\cos 2x$ (8M)

4. a) Solve the DE using transform method $y''+y=sint\ sin2t,\ y(0)=1, y'(0)=0$ (8M)

b) Find $L^{-1}\left\{\frac{1+2s}{(s+2)^2(s-1)^2}\right\}$ (8M)

5. a) Find the minimum and maximum distance from the origin to the curve $5x^2+6xy+5y^2-8=0$ using Lagrange's multiplier method. (8M)

b) Expand $\tan^{-1}(xy)$ in powers of (x-1)(y+1). (8M)
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6. a) Solve the PDE $xp - yq = y^2 - x^2$ (8M)

   b) Find all possible solutions of $z = px + qy + p^2q^2$ (8M)

7. a) Solve the PDE $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$ given that $u(x,0) = 0, \frac{\partial u}{\partial t}(0,t) = 0$ by the method of separation of variables. (8M)

   b) A bar of 50cm long with insulated sides kept at 0^0 C and that the other end is kept at 100^0 C until steady state conditions prevail. The two ends are suddenly insulated so that the temperature is zero at each end thereafter. Find the temperature distribution. (8M)