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

I B. Tech I Semester Supplementary Examinations, July/August- 2021

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**

~~~~~~

PART –A

1. a) Find the differential equation which represents family of straight lines with slope 'm' an not passing through the origin. (4M)

b) Find the solution of $y^{11}+y=\sin 2x$. (4M)

c) Find the inverse Laplace transform of $\left(\frac{s}{(s+a)^2+b^2}\right)$. (4M)

d) Find the Laplace transform of $t^{7/2}e^{3t}$. (4M)

e) Formulate the partial differential equation from z=f(x+y). (3M)

f) Find the solution of the partial differential equation $p^2+q=3$. (3M)

PART –B

2. a) Solve $(y\cos x+\sin y+y)dx+(\sin x+x\cos y+x)dy=0$. (8M)

b) If the air is maintained at 30^0C and the temperature of the body cools from 80^0C to 60^0C in 12 minutes, find the temperature of the body after 24 minutes. (8M)

3. a) Solve $(D^2+3D+2)y=e^{-x}+cosx$. (8M)

b) Solve $(D^2+D)y=x^2+2x+4$. (8M)

4. a) Find $L\left[e^{-3t}\int_0^t \frac{1-\cos t}{t^2}dt\right]$ (8M)

b) Solve $(D^2+6D+9)y=\sin t$ given that $y(0)=1, y'(0)=0$. (8M)

5. a) If $u=\frac{yz}{x}$, $v=\frac{xz}{y}$, $w=\frac{xy}{z}$ find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$. (8M)

b) Find the minimum value of $x^2+y^2+z^2$ given $x+y+z=3a$. (8M)

6. a) From the partial differential equation by eliminating the arbitrary functions f and g from $z=xf(ax+by)+g(ax+by)$ (8M)

b) Solve $(x^2-y^2-yz)p+(x^2-y^2-zx)q=z(x-y)$. (8M)
~~~~~~

7. a) Solve $u_x = 2u_t + u$ where $u(x,0) = 6e^{-3x}$. (8M)

b) A rightly stretch of length 20 cms., fastened at both ends is displaced from its position of equilibrium, by imparting to each of its points an initial velocity given by $V(x) = \begin{cases} x, & 0 \le x \le 10 \\ 20 - x, & 10 \le x \le 20 \end{cases}$, x being the distance from one end. Determine the displacement at any subsequent time. (8M)