Code No: R161102 **R16** SET - 1

I B. Tech I Semester Supplementary Examinations, January - 2020
MATHEMATICS-I

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 **FOUR** Questions from **Part-B**

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PART –A

1. a) Write the Linear differential equation in 'y'. (2M)

b) Find the P.I of $\frac{d^2y}{dx^2} + 4y = \sin 2x$ (2M)

c) Find $L^{-1}\left(\frac{3}{\left(s-\frac{\pi}{2}\right)^4}\right)$ (2M)

d) Find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ if $u = \sin^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{x}{y}\right)$ (2M)

e) Write the second shifting theorem in Laplace transform. (2M)

f) Solve the PDE $pq = 1$ (2M)

g) Classify the PDE $4\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial^2 u}{\partial x \partial y} - 4\frac{\partial^2 u}{\partial y^2} + 5\frac{\partial u}{\partial x} + 6\frac{\partial u}{\partial y} + u = 0$ (2M)

PART -B

2. a) Solve the ODE $(y - xy^2)dx - (x + x^2 y)dy = 0$ (7M)

b) Solve the equation $L\frac{di}{dt} + iR = 200 \cos 300\, t$, when R = 100, L = 0.05 find i if $i(0) = 0$. (7M)

3. a) Solve the ODE $\left(D^2 + D\right)y = \frac{1}{1 + e^x}$ (7M)

b) By Method variation of parameters solve the ODE $(D^2 + 4)y = 4 \tan 2x$ (7M)
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4. a) By convolution find $L^{-1}\left(\frac{1}{(s^2+a^2)(s^2+b^2)}\right)$ (7M)

   b) Evaluate $\int_0^\infty e^{-t}\frac{(\cos 3t-\cos 2t)}{t}dt$ (7M)

5. a) Find the temperature at any point (x ,y ,z) in space is f =400xy z^2 find the highest temperature on the surface of the unit sphere $x^2+y^2+z^2=1$ (7M)

   b) Determine whether the functions $u=e^x\sin y, v=e^x\cos y$ are functionally dependent or independent. (7M)

6. a) Solve the PDE $\left(\frac{y-z}{yz}\right)p+\left(\frac{z-x}{xz}\right)q=\left(\frac{x-y}{xy}\right)$ (7M)

   b) Solve the PDE $pq=x^m y^n z^l$ (7M)

7. a) Solve the PDE $\left(D^3-4D^2D^1+4DD^{1^2}\right)z=2\sin(3x+2y)$ (7M)

   b) Solve the PDE $\left(D^3-4D^2D^1+5DD^{1^2}-2D^{1^3}\right)z=\sqrt{x+y}$ (7M)