I B. Tech I Semester Supplementary Examinations, May/June - 2019
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 Bernoulli's equation.   (2M)

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

   c) Find $L\left(\int_0^t \cosh t\, dt \right)$ (2M)

   d) If $x = r\cos\theta$, $y = r\sin\theta$ then find $J\left(\dfrac{x,\, y}{r,\, \theta} \right)$ (2M)

   e) Find $L^{-1}\left(\dfrac{1}{(s+1)^3} \right)$ (2M)

   f) Solve the PDE $z = px + qy + p + q$ (2M)

   g) Classify the PDE $(x+1)\dfrac{\partial^2 u}{\partial x^2} - 2(x+2)\dfrac{\partial^2 u}{\partial x \partial y} + (x+3)\dfrac{\partial^2 u}{\partial y^2} = 0$ (2M)

PART -B

2. a) Solve the ODE $\left(3xy^2 - y^3\right)dx - \left(2x^2 y - xy^2\right)dy = 0$ (7M)

   b) Find the orthogonal trajectories of the family of parabolas y2=4ax where a is parameter. Check is it self orthogonal (or) not.   (7M)

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

   b) Solve the ODE $\left(D^2 + 3D + 2\right)y = xe^x \sin x$ (7M)

4. a) Evaluate $L^{-1}\left(\dfrac{1}{s^3(s-4)} \right)$ (7M)

   b) Evaluate $\int_0^\infty e^{-t}\, \dfrac{\sin^2 t}{t}\, dt$ (7M)

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5. a) Using Lagrange's function find the minimum value of $x^2 + y^2 + z^2$ subject to   (7M)
       ax +by+cz = a+b+c

    b) Expand sin(xy) in powers of (x-1)(y-π/2).   (7M)

6. a) Solve the PDE $\left(\dfrac{b-c}{a}\right) yzp + \left(\dfrac{c-a}{b}\right) xzq = \left(\dfrac{a-b}{c}\right) xy$ (7M)

    b) Solve the PDE $z^2 = x^2 p^2 + xpq$ (7M)

7. a) Solve the PDE $\left(4D^2 + 12DD^1 + 9D^{1^2}\right) z = e^{3x-2y}$ (7M)

    b) Solve the PDE $\left(D^2 - DD^1\right) z = \sin x \cos 2y$ (7M)

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