

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**

PART -A

1. a) Write the Bernoulli's equation. (2M)
- b) Find the P.I of $\frac{d^2y}{dx^2} + y = x^2$ (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 $J\left(\frac{x, y}{r, \theta}\right)$ (2M)
- e) Find $L^{-1}\left(\frac{1}{(s+1)^3}\right)$ (2M)
- f) Solve the PDE $z = px + qy + p + q$ (2M)
- g) Classify the PDE $(x+1)\frac{\partial^2 u}{\partial x^2} - 2(x+2)\frac{\partial^2 u}{\partial x\partial y} + (x+3)\frac{\partial^2 u}{\partial y^2} = 0$ (2M)

PART -B

2. a) Solve the ODE $(3xy^2 - y^3)dx - (2x^2y - xy^2)dy = 0$ (7M)
- b) Find the orthogonal trajectories of the family of parabolas $y^2 = 4ax$ where a is parameter. Check is it self orthogonal (or) not. (7M)
3. a) Solve the ODE $(D^2 - 3D + 2)y = \sin(e^{-x})$ (7M)
- b) Solve the ODE $(D^2 + 3D + 2)y = xe^x \sin x$ (7M)
4. a) Evaluate $L^{-1}\left(\frac{1}{s^3(s-4)}\right)$ (7M)
- b) Evaluate $\int_0^{\infty} e^{-t} \frac{\sin^2 t}{t} dt$ (7M)

5. a) Using Lagrange's function find the minimum value of $x^2 + y^2 + z^2$ subject to $ax + by + cz = a + b + c$ (7M)
- b) Expand $\sin(xy)$ in powers of $(x-1)(y-\pi/2)$. (7M)
6. a) Solve the PDE $\left(\frac{b-c}{a}\right)yzp + \left(\frac{c-a}{b}\right)xzq = \left(\frac{a-b}{c}\right)xy$ (7M)
- b) Solve the PDE $z^2 = x^2 p^2 + xpq$ (7M)
7. a) Solve the PDE $(4D^2 + 12DD^1 + 9D^{1^2})z = e^{3x-2y}$ (7M)
- b) Solve the PDE $(D^2 - DD^1)z = \sin x \cos 2y$ (7M)