

I B. Tech I Semester Supplementary Examinations, August/Sep - 2022
MATHEMATICS-I

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

1. a) Define order and degree of the differential equation (2M)
- b) Solve the D.E of $\frac{d^2y}{dx^2} + 9y = 0$ (2M)
- c) Find $L(t^3 + 5t - 1)$ (2M)
- d) Define Euler's theorem for two variables (2M)
- e) Find $L^{-1}\left(\frac{2}{(s-3)}\right)$ (2M)
- f) Solve the PDE $z = px + qy + p + q + pq$ (2M)
- g) Classify the PDE $\frac{\partial^2 u}{\partial x \partial y} + 3 \frac{\partial^2 u}{\partial y^2} = 0$ (2M)

PART -B

2. a) Solve the ODE $(1 + xy)ydx + (1 - xy)xdy = 0$ (7M)
- b) Find the orthogonal trajectory of the family of curves $y^2 = 4ax$ (7M)
 Where 'a' is the parameter.
3. a) Solve the ODE $(D^2 - 4)y = xe^x$ (7M)
- b) Solve the ODE by the method of variation of parameters $(D^2 - 3D + 2)y = 2x$ (7M)
4. a) Evaluate $L^{-1}\left(\frac{1}{s(s-4)}\right)$ using convolution theorem (7M)
- b) Find Laplace transform of $\phi(t)$ where $\phi(t) = \begin{cases} t^2, & 0 < t < 2 \\ t - 1, & 2 < t < 3 \\ 7, & t > 3 \end{cases}$ (7M)
5. a) Using Lagrange's function find the minimum value of $x^2 + y^2 + z^2$ subject to $x + y + z = a$ (7M)
- b) Expand $\cos x$ about $x = \pi/4$ using Taylor's series expansion (7M)
6. a) Solve the PDE $xq - py = zx$ (7M)
- b) Solve the PDE $z = pq$ (7M)
7. a) Solve the PDE $(D^2 + 2DD^1 + 6D^{1^2})z = e^{x+2y}$ (7M)
- b) Solve the PDE $(D^2 + D^{1^2})z = xy$ (7M)