

I B. Tech I Semester Supplementary Examinations, April - 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 Bernoulli equation (2M)
- b) Solve the D.E of $\frac{d^2y}{dx^2} - 4y = 0$ (2M)
- c) Find $L^{-1}\left(\frac{3}{(s+2)}\right)$ (2M)
- d) Find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ if $u = \frac{y}{x}$ (2M)
- e) Write Laplace transform of $\sin 2t$ (2M)
- f) Solve the PDE $p - q = 1$ (2M)
- g) Classify the PDE $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial y^2} = 0$ (2M)

PART -B

2. a) Solve the ODE $x\frac{dy}{dx} + y = x\sin 2x$ (7M)
- b) A body kept in air with temperature 25°C cools from 140°C to 80°C in 20 minutes. Find when the body cools down to 35°C (7M)
3. a) Solve the ODE $(D^2 + 5D + 6)y = \sin 2x$ (7M)
- b) By Method variation of parameters solve the ODE $(D^2 + 4)y = 2x$ (7M)
4. a) By convolution theorem find $L^{-1}\left(\frac{1}{(s^2+4)(s^2+9)}\right)$ (7M)
- b) Evaluate $\int_0^{\infty} e^{-3t} \frac{\sin t}{t} dt$ using Laplace transform (7M)
5. a) Expand $\log(1+x)$ about $x = 0$ using Taylor's series expansion (7M)
- b) Find the $J\left(\frac{u,v,w}{x,y,z}\right)$ if $u = x + y, v = x^2 + y^2, w = xy$ (7M)
6. a) Form partial differential equation by eliminating arbitrary function from $z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$ (7M)
- b) Solve the PDE $yzp + xq = xy$ (7M)
7. a) Solve the PDE $(D^2 + DD^1 - 6D^1^2)z = \sin(2x + y)$ (7M)
- b) Solve the PDE $(D^2 - D^1^2)z = x + y$ (7M)