

I B. Tech I Semester Supplementary Examinations, May - 2018
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) Solve the DE $y(xy + e^x)dx - e^x dy = 0$. (2M)
- b) Solve the DE $y^{11} - 2y^1 + 10y = 0$, given $y(0) = 4$, $y^1(0) = 1$. (2M)
- c) If $u = \frac{x^2 y^2}{x + y}$ then find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ (2M)
- d) If $f(x, y, z) = e^{xyz}$ then find $\frac{\partial^3 f}{\partial x \partial y \partial z}$ (2M)
- e) Find $L\{\delta(t - 3)\}$ (2M)
- f) Solve $z = p(x+1) + q(y+2)$. (2M)
- g) Classify the nature of the PDE $\frac{\partial^2 u}{\partial x^2} + 2 \frac{\partial^2 u}{\partial x \partial y} + 4 \frac{\partial^2 u}{\partial y^2} = 0$ (2M)

PART -B

2. a) 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)
- b) An R - L circuit has an Emf given (in volts) by $10 \sin t$, a resistance of 90 ohms, an inductance of 4 henries. Find the current at any time t by assuming zero initial current. (7M)
3. a) Solve the DE $(D^2 + 1)y = \cot x$ by the method of variation of parameters (7M)
- b) Determine the charge on the capacitor at any time $t > 0$ in circuit in series having an emf $E(t) = 100 \sin 60 t$, a resistor of 2 ohms, an inductor of 0.1 henries and capacitor of $\frac{1}{260}$ farads, if the initial current and charge on the capacitor are both zero. (7M)
4. a) Evaluate $\int_0^{\infty} \frac{e^{-t} - e^{-2t}}{t} dt$ (7M)
- b) Using Laplace transform solve $y(t) = \sin t + \int_0^t u y(t - u) du$ (7M)
5. a) Find the minimum value of $x^2 + y^2 + z^2$ subject to $ax + by + cz = p$. (7M)

- b) Check whether the following are functionally dependent or not, then find the relation between $u = \frac{x-y}{x+y}$, $v = \frac{xy}{(x+y)^2}$ (7M)
6. a) Find partial differential equation by eliminating arbitrary function $f(x^2 + y^2, z - xy) = 0$ (7M)
- b) Solve the PDE $\frac{p^2}{z^2} = 1 - pq$. (7M)
7. a) Solve the PDE $(D^2 - 3D - D^1 + 3D^1)z = e^{x-2y}$ (7M)
- b) Solve the PDE $(D - D^1 - 1)(D - D^1 - 2)z = x + e^{3x-y}$ (7M)