Code No: R161102 **R16** SET - 1

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**

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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 $u = \frac{x^2y^2}{x+y}$ 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 25^0C cools from 140^0C to 80^0C in 20 minutes. Find when the body cools down to 35^0C. (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 $(D^2 + 1)y$ = cotx 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 $y(t) = sint + \int_0^t u\, y(t-u)\, du$ (7M)

5. a) Find the minimum value of $x^2 + y^2 + z^2$ subject to ax + by + cz = p. (7M)
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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 $\left(D^2 - 3D - D^{1^2} + 3D^1\right)z = e^{x-2y}$ (7M)

b) Solve the PDE $\left(D - D^1 - 1\right)\left(D - D^1 - 2\right)z = x + e^{3x-y}$ (7M)