Subject Code: R13102/R13 **Set No - 1**

I B. Tech I Semester Supplementary Examinations December - 2016

MATHEMATICS-I

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1. (a) State Newton's law of cooling and write the corresponding differential equation.
   (b) Solve $\frac{dy}{dx}+\frac{y}{x}=x^3-3$
   (c) Find the Laplace transform of Heaviside function.
   (d) Expand $f(x,y)=e^x \sin y$ in powers of x and y using McLaurin's series.
   (e) Solve $p^2 + q^2 = m^2$.
   (f) Write one dimension wave equation and its possible solutions.

[3+4+4+4+3+4]

PART –B

2. (a) Solve $2xydy - (x^2+y^2+1)dx = 0$.
   (b) Suppose that an object is heated to 300°F and allowed to cool in a room maintained at 80°F. If after 10 minutes, the temperature of the object is 250°F, what will be its temperature after 20 minutes?

[8+8]

3. (a) Solve $y''-2y'+2y=e^x+\cos x$.
   (b) Solve $y''-2y'+y=x.e^x.\sin x$

[8+8]

4. (a) Are the functions $u= x+y+z$, $v = x^2 +y^2+z^2$, $w= x^3+y^3 +z^3 -3xyz$ functionally independent?
   (b) Examine the function $f(x,y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$ (x>0, y>0) for extreme values .

[8+8]

5. (a) Find $L[\, t\, e^t \sinh t]$
   (b) Find the solution of $y''+y=\sin 3t$, $y(0)=y'(0)=0$.

[8+8]

6. (a) Form the partial differential equation formed by eliminating the arbitrary constants from $Z = ax^3 + by^3$.
   (b) Solve $x(y-z)p + y(z-x)q = z(x-y)$.

[8+8]

7. (a) Solve $(D^3-4D^2D'+4DD'^2)z=2\sin(3x+2y)$, where D= $D=\frac{\partial}{\partial x}$, $D'=\frac{\partial}{\partial y}$.
   (b) Using the method of separation of variables, Solve $\frac{\partial u}{\partial x}=2\frac{\partial u}{\partial t}+u$ where $u(x,0) = 6.e^{-3x}$.

[8+8]

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