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Total No. of Questions: 09

## B.Tech. (2010 Batch) (Sem. – 1) ENGINEERING MATHEMATICS-I M Code: 54001 Subject Code: AM-101 Paper ID: [A0111]

#### Time: 3 Hrs.

#### Max. Marks: 60

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#### INSTRUCTIONS TO CANDIDATES:

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION B & C have FOUR questions each.
- 3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
- 4. Select at least TWO questions from each SECTION B & C.

### SECTION A

- 1. a) What do you mean by double point and node.
  - b) Explain Homogeneous functions.
  - c) Define Moment of Inertia.
  - d) Write down Taylor's and Maclaurin's series.
  - e) Explain Beta and Gamma functions.
  - f) Discuss Errors and approximations.
  - g) Discuss the convergence of the series  $\sum_{n=1}^{\infty} \frac{n^2}{2n}$
  - h) Define absolutely convergent series with an example.
  - i) What do you mean by uniform convergence.
  - j) Discuss hyperbolic functions of complex variables.

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#### **SECTION B**

- 2. Trace the following curves:
  - a)  $x^2y^2 = a^2(y^2 x^2)$  b)  $r = a \cos 2\theta$
- 3. a) Find the area of the segment cut off from the parabola  $x^2 = 8y$  by the line x 2y + 8 = 0.
  - b) Show that the area included between the curve  $x^3 + y^3 = 3axy$  and its asymptote is equal to the area of the loop.
- 4. a) If  $z = \log(u^2 + v)$ ,  $u = e^{x^2 + y^2}$ ,  $v = e^{x^2 + y}$  then find  $\frac{\partial z}{\partial x} \& \frac{\partial z}{\partial y}$ 
  - b) State and discuss Lagrange's method of undetermined multipliers.
- 5. Find the points on the surface  $z^2 = xy + 1$  nearest to the origin.

# SECTION C

- 6. Find the equation of the sphere through the circle  $x^2 + z^2 = a^2$ , y = k and having its centre on the plane x + y + z = b
- 7. a) Evaluate  $\int_{1}^{2} \int_{1}^{3} xy^{2} dx dy$ 
  - b) Test the convergence of the series  $x + 2x^2 + 3x^3 \dots \infty$
- 8. a) Separate real and imaginary parts of tanh(x + iy) and sinh(x + iy)
  - b) Sum the series  $\cos x + \sin x \cos 2x + (\sin^2 x/1.2) \cos 3x + \dots \infty$
- 9. a) Find all the values of  $(-1)^{1/6}$ 
  - b) Define right circular cone. Find the equation of a right circular cone generated when the straight line 2x + 3z = 6, x = 0 revolves about z-axis.