

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech.(2009-2010 Batches) (Sem.-1)
ENGINEERING MATHEMATICS-I

Subject Code: AM-101 Paper ID: [A0111]

Time: 3 Hrs. Max. Marks: 60

## **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 atleast TWO questions from SECTION B & C.

#### **SECTION-A**

# 1. Write briefly:

a) Simplify 
$$\left(\frac{\cos\theta + i\sin\theta}{\sin\theta + i\cos\theta}\right)^4$$

- b) Find the general value of  $\log (1 + i \tan \alpha)$ .
- c) Define Gauss Test.
- d) Prove that Beta function is symmetric.
- e) Write an equation for hyperboloid.
- f) Define root mean square value.

g) If 
$$u = \frac{yz}{x}$$
,  $v = \frac{zx}{y}$ ,  $w = \frac{xy}{z}$ . Find  $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ .

- h) Find the equation of the tangent plane and the normal to  $xy + z = a^2$  at (1, 1, 1).
- i) Define Oscillatory Sequence.
- j) Expand  $e^x \sin y$  in powers of x and y.

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### **SECTION-B**

- 2. Trace the curve y = x+1/x.
- 3. Find the area above the x-axis included between the curves  $y^2 = 2ax x^2$ ,  $y^2 = ax$ .
- 4. If  $u = x^2 \tan^{-1} \frac{y}{x} y^2 \tan^{-1} \frac{x}{y}$ , then evaluate  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ .
- 5. Find the point on the surface  $z^2 = xy + 1$  nearest to the origin.

### **SECTION-C**

- 6. Find the equation of the circular cylinder having for its base the circle  $x^2 + y^2 + z^2 = 9$ , x y + z = 3
- 7. Find the area between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$
- 8. Test the convergence of the series  $\frac{1}{1} + \frac{3}{7} \cdot x + \frac{3.6}{7.10} x^2 + \frac{3.6.9}{7.10.13} x^3 + \dots \infty$
- 9. If  $\tan \frac{x}{2} = \tan h \frac{u}{2}$ , then prove that  $\tan x = \sinh u$ ,  $\cos x \cos h u = 1$ .

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