Roll No. | | | | | | | | | | | | | 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) Under what condition or conditions, a curve is symmetrical in the opposite quadrants?

b) Find the area bounded by the parabola $y^2 = 4x$ and its latus rectum.

c) State Euler's theorem on homogeneous functions.

d) If $x = r\cos\theta$, $y = r\sin\theta$, show that, $\frac{\partial r}{\partial x} = \frac{\partial x}{\partial r}$.

e) State Taylor's series for a function of two variables.

f) Find the equation of the sphere in which the end points of one of the diameters, are (2,–3,1) and (3,–1,2).

g) Define a gamma function.

h) State root test for the convergence of a positive term series.

i) Solve the equation $x^4 = -1$.

j) Give an example of an oscillatory series.

SECTION-B

2. Find the radius of curvature at the vertex of the cycloid, $x = a(\theta + \sin\theta)$; $y = a(1 - \cos\theta)$.

3. Find the area of the curve $r^2 = a^2\cos\theta$.

4. If $u = x \log xy$, where $x^3 + y^3 + 3xy = 1$, find $\frac{du}{dx}$.

5. Discuss the extreme values of, $x^3 - y^2 - 7x^2 + 4y + 15x - 13$.

SECTION-C

6. Find the equation to the right circular cone whose vertex is at (2,–3,5), axis makes equal angles with the coordinate axes, and the vertical angle is measured to be 60°.

7. Evaluate $\int\int\int xyz\,dz\,dy\,dx$ over the volume enclosed by three coordinate planes and the plane, $x + y + z = 1$.

8. Test the convergence of the series, $x(\log 1)^p + x^2(\log 2)^p + x^3(\log 3)^p + x^4(\log 4)^p + ...$

9. If $\tan(x + iy) = \sin(u + iv)$, prove that, $\sin 2x \cot u = \sinh 2y \coth v$.