Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Civil) (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 short notes on :

1. State the Euler's theorem on homogenous functions.
2. State the integral test for positive term series.
3. Find the mean square value of sin x in the interval (0,1).
4. Write the Taylor's series expansion of $f(x_0 + h, y_0 + k)$ up to second order.
5. Separate the real and imaginary parts of $e^{\left(5+i\frac{\pi}{2}\right)}$.
6. If $u = x^3 + xy$ and $v = xy$. Find $\frac{\partial(u,v)}{\partial(x,y)}$.
7. Using double integration, find the area enclosed between the curves $y^2 = x^3$ and $x = y$.
8. Define Beta function and find $\beta\left(\frac{1}{2},\frac{1}{2}\right)$.
9. Find the equations of the normal to the surface $z^2 = 4(1 + x^2 + y^2)$ at (2,2,6).
10. Write the equation of ellipsoid and draw a rough sketch of it.

SECTION-B

2. Sketch the Polar curve $r = 1 + 2\sin\theta$ by giving all the salient features.

3. If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$.

4. Using the method of Lagrange's, find the the minimum value of $x^2 + y^2 + z^2$, given that $xyz = a^3$.

5. Find the volume of solid formed by the revolution of x = a(θ — sin θ), y = a(1 — cos θ), about its base.

SECTION-C

6. Find the series radius and interval of convergence. For what value of x does the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}\, n(x+2)^n}{2^n n}$ converge (a) absolutely (b) conditionally

7. Solve by changing the order of integration $\int_0^3 \int_{\sqrt{x/3}}^1 e^{y^3}\, dydx$.

8. Find the equation of the cone whose vertex is (1,2,3) and which passes through the circle $x^2 + y^2 + z^2 = 4, x + y + z = 1$.

9. Find the sum of trigonometric series $\sin a + x\sin(a + b) + \frac{x^2}{2!}\sin(a + 2b) + \ldots$.