

Roll No.

Total No. of Pages : 2

Total No. of Questions : 09

B.Tech. (Sem.-1)

ENGG. MATHEMATICS-I

Subject Code : AM-101 (2005-2010 Batches)

Paper ID : [A0111]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION 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) What do you mean by curvature of Cartesian curves ?
- b) Explain centre of gravity.
- c) Define homogeneous functions.
- d) Write down Taylor's and Maclaurin's series for functions of two variables.
- e) Explain Beta and Gamma functions.
- f) Discuss Errors and Approximations.
- g) Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{n^2}{3^n}$
- h) Define uniform convergent series with an example.
- i) What do you mean by logarithmic complex function ?
- j) Find the root of $\sin z = \cosh 4$

SECTION-B

2. Trace the following curves :

- a) $x^2 y^2 = a^2 (y^2 - x^2)$
 - b) $r = a (1 + \cos 2\theta)$
3. a) Find the area of the segment cut off from the parabola $x^2 = 16y$ 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) Discuss the maxima and minima of $f(x,y) = x^3 y^2 (1 - x - y)$.
5. a) Find the points on the surface $z^2 = xy + 1$ nearest to the origin.
 - b) Explain Jacobian and its properties

SECTION-C

6. Explain equation of sphere. Find the equation of the sphere through the circle $x^2 + z^2 = b^2$, $y = k$ and having its centre on the plane $x + y + z = a$
7. a) Evaluate $\int_3^4 \int_1^3 xy^2 dx dy$
 - 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 $\cosh(x + iy)$
 - 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 $4x + 6z = 12$, $x = 0$ revolves about z-axis.