B.Tech. (Sem. - 1ˢᵗ / 2ⁿᵈ)

MATHEMATICS - I

SUBJECT CODE : AMA - 101 (2K2 & 2K3)

Paper ID : [A0101]

[**Note** : Please fill subject code and paper ID on OMR]

Time : 03 Hours   **Maximum Marks : 60**

Instruction to Candidates:

1)   Section - A is **Compulsory**.

2)   Attempt any **Five** questions from Section - B & C.

3)   Select atleast **Two** questions from Section - B & C.

Section - A

Q1)   *(Marks : 2 each)*

a)   Separate real and imaginary parts of coth $(x + iy)$.

b)   Find modulus and amplitude of the function $(1 + \sin x - i \cos x)$.

c)   Explain homogenous second degree equation in three variables.

d)   What is uniform convergence?

e)   Explain logarithmic test.

f)   Define moment of inertia.

g)   Explain Lagrange's multipliers.

h)   Find all the roots of the equation $\cos z = 2$.

i)   Define composite functions.

j)   Write diameter form of sphere.

Section - B

Q2) Prove that if the perimeter of a triangle is constant, its area is maximum when the triangle is equilateral.

Q3) (a) Expand $x^2y + 3y - 2$ in powers of $(x - 1)$ and $(y + 2)$ using Taylor's theorem.

(b) Find the equation of the right circular cone generated when the straight line $2y + 3z = 6$, $x = 0$ revolves about z axis.

Q4) Find the volume of the Ellipsoid.

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.$$

Q5) (a) Evaluate $\iiint (x + y + z)\,dxdydz$ over the tetrahedron bounded by the planes $x = 0$, $y = 0$, $z = 0$ and $x + y + z = 1$.

(b) Find the M.I. of the area bounded by the curve $r^2 = a^2 \cos^2 \theta$ about its axis.

Section - C

Q6) Find the sum of infinity of the series.

$$1 - \frac{1}{2}\cos\theta + \frac{1\cdot 3}{2\cdot 4}\cos 2\theta - \frac{1\cdot 3\cdot 5}{2\cdot 4\cdot 6}\cos 3\theta + - - - - - - - - \infty.$$

Q7) Test for convergence the series

$$\sum \frac{(n!)^2}{(2n!)}\cdot x^{2n}.$$

Q8) Solve the following equations by Crout's method.

$10x + y + z = 12$

$2x + 10y + z = 13$

$2x + 2y + 10z = 14$

Q9) Find all the values of $(1 + i)^{1/3}$ and obtain their product.