Roll No. ....

Total No. of Questions : 09]

B.Tech. (Sem. - 4th)

MATHEMATICS - III

SUBJECT CODE : CS-204

Paper ID : [A0495]

[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 **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 × 2 = 20)*

a) Evaluate $\lim_{x\to 3}\frac{x^2-9}{x-3}$.

b) State mean value theorem.

c) Evaluate $L(2e^{2t} - e^{-3t})$.

d) State Cauchy's theorem.

e) Write the definition of Laplace Transform.

f) Check the analyticity of the function $f(z) = |z|^2 + \frac{Z^{-2} - Z^2}{2}$.

g) Write down the form of Wave equation and Heat equation in one dimension.

h) Explain conformal mapping.

i) Solve $(D^4 - 16)y = 0$.

j) Given $y' = -y$ where $y(0) = 1$,

Find y (0.02) by using Euler's method.

Section - B

(4 × 5 = 20)

Q2) State and prove of Cauchy's integral farmula.

Q3) Find the centre of gravity of the arc of the curve $x = a \sin^3\theta$, $y = a \cos^3\theta$.

Q4) Find the Laplace Transformation of $F(t) = \begin{Bmatrix} \cos t, & 0 \angle t \angle \pi \\ 0, & t \angle \pi \end{Bmatrix}$.

Q5) Use the method of separation of variables to solve the equation.

$$\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial y} + 2u.$$

Q6) Given $\frac{dy}{dx} = 1 + y^2$, where $y(0) = 1$, find $y(0.2)$, $y(0.4)$ by using Runge-Kutta Fourth Order Formula.

Section - C

(2 × 10 = 20)

Q7) Show that the function defined by $f(z) = \sqrt{|xy|}$ is not regular at the origin, although Cauchy-Riemann equations are satisfied.

Q8) Evaluate $\int_0^{\pi} \frac{d\theta}{a + b\cos\theta}$, where $a > |b|$.

Q9) Solve the equation $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$ with boundary conditions $u(x, 0) = 3 \sin n\pi x$, $u(0, t) = 0$, $u(1, t) = 0$, where $0<x<1$.