

Roll No.

Total No. of Questions : 09]

[Total No. of Pages : 02

Paper ID [CS203]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 3rd/4th)

MATHEMATICS - III (CS - 204/203)

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)

(10 × 2 = 20)

- a) Write down the statement of Rolle's theorem.
- b) Define analytic function.
- c) Define Laplace transform, also write down three properties of Laplace transformation.
- d) Write down Laplace equations.
- e) Determine analytic function, whose real part is $\cos x$ cosh y.
- f) Expand $\frac{1}{(Z+1)(Z+3)}$ in Laurent's series.
- g) Find the inverse laplace transform of $\left(\frac{s^2}{(s^2+4)^2} \right)$.
- h) Write down the Runge-Kutta formula.
- i) Using C-R equations, show that $f(z) = z^3$ is analytic in the entire z-plane.
- j) Define Residues with an example.

Section - B

(Marks : 8 Each)

Q2) Verify Rolle's Theorem for

$$F(x) = x(x+3)e^{\frac{-x}{2}} \text{ in the interval } (-3,0).$$

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- Q3) Expand $\tan^{-1} \frac{y}{x}$ in the neighborhood of $(1,1)$ by Taylor's Theorem.
- Q4) Define continuity of the function, also write the properties of continuous function.
- Q5) Evaluate the following integral using Cauchy integral formula
- $$\int_c \frac{4-3z}{z(z-1)(z-2)} dz.$$

Section - C

(Marks : 8 Each)

- Q6) Find the residue of $f(z) = \frac{ze^z}{(z-a)^3}$.
- Q7) Use the method of separation of variables to solve the equation
- $$\frac{\partial^2 v}{\partial x^2} = \frac{\partial v}{\partial t}.$$
- Q8) The ends A and B of a rod 20 cm long have the temperatures at 30°C and at 80°C until steady state prevails. The temperature of the ends is changed to 40°C and 60°C respectively. Find the temperature distribution in the rod at time t .
- Q9) Apply Runge-Kutta formula to find an approximate value of y when $x+1.1$ given that : $\frac{dy}{dx} = x - y$.

