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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 x 2 = 20)*

a) Write down the statement of Rolls 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$x$ cushy.

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

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

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 : $\frac{dy}{dx} = x - y$.

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