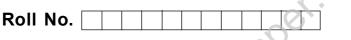
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Total No. of Pages : 02

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B.Tech. (CSE/IT) (Sem.-4th) MATHEMATICS-III Subject Code : CS-204 Paper ID : [A0495]

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 contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

l. Write short notes on :

- (a) Find the point where the Cauchy-Riemann equations are satisfied for the function $f(z) = xy^2 + ix^2y$.
- (b) State fundamental theorem of integral calculus.
- (c) Find the deflection of a vibrating string of unit length having fixed ends with initial velocity zero and initial deflection $f(x) = k (\sin x - \sin 2x).$

(d) Explain briefly the Picard's method for the numerical solution of the

differential equation
$$\frac{dy}{dx} = f(x, y)$$

- (e) State Roll's Theorem.
- (f) Write the general linear partial differential equation of second order in two independent variables. Under what conditions it will be parabolic?
- (g) Determine the poles of the function

 $f(z) = \frac{z^2}{(z-1)^2 (z+2)}$. Also find the residue at the "pole of order 2".

- (h) Find the area of the segment cut off from the parabola $x^2 = 8y$ by the line x 2y + 8 = 0.
- (i) A rod of length l with insulated sides is initially at a uniform temperature u_0 , its ends are suddenly cooled to 0°C and are kept at that temperature. If it is required to find the temperature function u(x, t) then write down the initial and the boundary conditions.
- (j) State Laurent's theorem.

SECTION-B

- 2. Find the bilinear transformation which maps the points z = 1, i = -1 onto the points *i*, *o*, -i.
- 3. Find the volume of the tetrahedron bounded by the Co-ordinate planes and the plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$.
- 4. State and prove Cauchy's Integral formula.
- 5. Find by Taylor's series method, the value of y at x = 0.1 to five places of decimals from $\frac{dy}{dx} = x^2y - 1$, y(0) = 1.
- 6. Use the method of Separation of variables to solve the equation $\frac{\partial^2 V}{\partial x^2} = \frac{\partial V}{\partial t}$ given that v = 0, when $t \to \infty$ well as v = 0 at x = 0 and x = l.

SECTION-C

7. Apply Runge-Kutta method to find an approximate value of y when x = 0.2 (in two steps) given that $\frac{dy}{dx} = x + y$, y = 1, when x = 0.

- 8. Evaluate $\int_{0}^{2\pi} \frac{d\theta}{2 + \cos \theta}$ by contour integration in the complex plane.
- 9. A tightly stretched string with fixed end points x = 0 and x = l is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$, if it is released from rest from this position, find the displacement y(x, t).

[N-]