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Total Pages : 3

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B.Tech. (ECE, EIC) IVth Semester COMPUTATIONAL TECHNIQUES (HAS-206C)

Time : 3 Hours]

[Max. Marks: 75

Instructions :

- *(i)* All questions are compulsory in Part-I.
- (ii) Attempt any four questions from Part-II.

PART-I

- 1. (a) If $u = \frac{4x^2y^3}{z^4}$ and error in x, y, z be 0.001, compute the relative maximum error in u when x = y = z = 1.
 - (b) Write the formula of stirling method for interpolation.
 - (c) Construct a forward difference table for the following :
 - (d) Solve $e^{-x} x = 0$ by secant method.
 - (e) Write the formula for Weddle's and Boole's rule.
 - (f) Write the procedure to solve the simultaneous system of equation with the help of Relaxation method.
 - (g) Write the formula for Euler's and Modified Euler's method.
 - (h) Explain Crank-Nicolson method.

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[P.T.O.

(i) Find by Taylor's series method, the value of y at x = 0.1, x = 0.2 to five decimal places from $\frac{dy}{dx} = x^2y - 1$, given y(0) = 1.

(j) Evaluate
$$\int_{0}^{6} \frac{dx}{1+x^{2}}$$
 by using Trapezoidal Rule.
(1.5 × 10 = 15)

PART-II

(a) Interpolate by means of Gauss' backward formula, the population of a town for the year 1974, from the given data.
 Year 1939 1949 1959 1969 1979 1989

Year193919491959196919791989Population121520273952

(b) From the following table, find f(x) as a polynomial in x and find f(x) using Newton's divided difference formula.
 (8)

x	:	4	5	7	10	11	13
f(x)	:	48	100	294	900	1210	2028

- 3. (a) Find the root of equation $x = \frac{1}{2} + \sin x$ by using iteration method. (7)
 - (b) Find the real root of equation $x^3 2x 5 = 0$ by the method of false position correct to three decimal places. (8)
- 4. Solve the following system of equations by using Gauss-Jacobi and Gauss-Seidel methods (correct to three decimal places): (15)

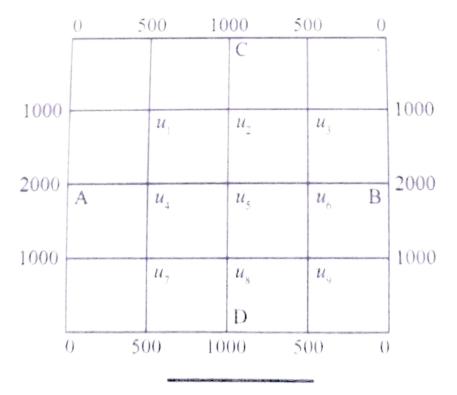
$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

$$6x + 3y + 12z = 35$$

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- 5. (a) Use Romberg's integration method to find $\int \frac{dx}{1+x^2}$ correct to four decimal places. (7)
 - (b) Find the integral $\int_{10}^{18} \frac{e^x + e^{-x}}{2}$ using Simpson's 1/3rd and 3/8th rule by taking h = 0.2. (8)
- 6. Using RK method of order four, compute y(0.2) and y(0.4) from $10 \frac{dy}{dx} = x^2 + y^2$, y(0) = 1, taking h = 0.1. (15)
- 7. Solve the elliptic equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ (Laplace equation) for the following square mesh with boundary values as shown : (15)



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