BCA/D-15

1036

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COMPUTER ORIENTED NUMERICAL METHOD

Paper-BCA-236

Time Allowed: 3 Hours [Maximum Marks: 80

Note: Attempt five questions in all, selecting at least one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

- 1. (a) Evaluate $\int_{0}^{6} \frac{1}{1+x^2}$ by using Simpson's three eighth rule taking h = 1.
 - (b) Show that the equation $x^3 4x^2 + 7x 5 = 0$ has at least one positive root and find the interval in which it lies.
 - (c) Using Euler's method, find the approximate value of y when x = 0.6 of the differential equation $\frac{dy}{dx} = 1 2xy$, given that y = 0, when x = 0 (take h = 0.2).
 - (d) Prove that:
 - (i) $E \equiv 1 + \Delta$.
 - (ii) $\nabla \equiv 1 E^{-1}$.

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UNIT-I

- 2. (a) Round off the numbers 4746235 and 765250 to four significant figures and compute Ea, Er, Ep in each case.
 - (b) Calculate the value of $(x^2 y^2) / (x + y)$ with x = 0.5481 and y = 0.2800, using normalized floating point form. Compare with the value of (x y). Determine the relative error.
- 3. (a) Find the real root of the equation $x^3 x^2 x 3 = 0$ by bisection method, correct to three decimal places.
 - (b) Derive Newton-Raphson method and find the order of convergence of Newton-Raphson method.

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UNIT-II

4. (a) Solve the following equations by triangularisation method:

$$2x + y + 2z = 2,$$

 $x + 5y + 3z = 4,$
 $x + y - z = 0.$

(b) Apply Gauss-Seidel iteration method, solve the following equations:

$$20x + y - 2z = 17,$$

 $3x + 20y - z = -18,$
 $2x - 3y + 20z = 25.$

- 5. (a) Using Euler's method solve the equation $\frac{dy}{dx} = -y$ with the condition y(0) = 1 and taking h = 0.01. Find y(0.04).
 - (b) Using Runge-Kutta method of fourth order, compute y(0.2) in steps of 0.1 if $\frac{dy}{dx} = x + y^2$ given that y = 1 when x = 0.

UNIT-III

- 6. (a) State and prove Newton-Gregory formula for forward interpolation.
 - (b) Given that $\sqrt{12500} = 111.803399$, $\sqrt{12510} = 111.848111$ $\sqrt{12520} = 111.892806$, $\sqrt{12530} = 111.937483$, show by Gauss backward formula that $\sqrt{12516} = 111.874930$.
- 8. (a) Find the least square approximation of second degree for the discrete data.
 - x: -2 -1 0 1 2 y: 15 1 1 3 19
 - (b) Define Chebyshev Polynomials and find the first six Chebyshev polynomials with the help of recursion relation $T_{n+1}(x) = 2x \ T_n(x) T_{n-1}(x)$.

UNIT-IV

(a)	func	tion y	first a = f(x)	and see tabula	cond dated be	erivatie low at	es of the the poin	ne nt 8
:	1	1.2	1.	4	1.6	1.8	2.00	
: 0	.00	0.128	0.54	40 1	.2960	2.4320	4.00	
(b)	Usin	ng Bes	sel's fo	rmula,	, find f	1 (7.50)	from tl	ne 8
: 7	.47	7.48	7.49	7.50	7.51	7.52	7.53	
: 0	.193	0.195	0.198	0.201	0.203	0.206	0.208	
(a)	Der	rive Sin	npson'	s one-1	third r	ule.		8
(b)					0	x) dx by	applyi applyi	ng 8
	: : 0 (b) : 7 : 0 (a)	func x = : 1 : 0.00 (b) Usin follo : 7.47 : 0.193 (a) Der	function y x = 1.1 : 1	function y = f(x) x = 1.1 1 1.2 1.4 0.00 0.1280 0.54 (b) Using Bessel's for following table: 7.47 7.48 7.49 1.0.193 0.195 0.198 (a) Derive Simpson' (b) Evaluate the integral of the following table:	function y = f(x) tabula x = 1.1 1 1.2 1.4 1 0.00 0.1280 0.5440 1 (b) Using Bessel's formula following table: 1 7.47 7.48 7.49 7.50 1 0.193 0.195 0.198 0.201 (a) Derive Simpson's one-following table: (b) Evaluate the integral	function y = f(x) tabulated be x = 1.1 1 1.2 1.4 1.6 0.00 0.1280 0.5440 1.2960 (b) Using Bessel's formula, find f following table: 7.47 7.48 7.49 7.50 7.51 1.0.193 0.195 0.198 0.201 0.203 (a) Derive Simpson's one-third results for the second	function $y = f(x)$ tabulated below at $x = 1.1$ 1 1.2 1.4 1.6 1.8 1 0.00 0.1280 0.5440 1.2960 2.4320 (b) Using Bessel's formula, find f^1 (7.50) following table: 1 7.47 7.48 7.49 7.50 7.51 7.52 1 0.193 0.195 0.198 0.201 0.203 0.206 (a) Derive Simpson's one-third rule. (b) Evaluate the integral $\int_{0}^{3} (x^2 + 2x) dx$ by	function $y = f(x)$ tabulated below at the point $x = 1.1$ 1 1.2 1.4 1.6 1.8 2.00 1 0.00 0.1280 0.5440 1.2960 2.4320 4.00 (b) Using Bessel's formula, find f^1 (7.50) from the following table: 1 7.47 7.48 7.49 7.50 7.51 7.52 7.53 1 0.193 0.195 0.198 0.201 0.203 0.206 0.208 (a) Derive Simpson's one-third rule. (b) Evaluate the integral $\int_{0}^{3} (x^2 + 2x) dx$ by applying the second