END OF SEMESTER EXAMINATIONS, NOVEMBER - 2017
COMPUTER ORIENTED NUMERICAL METHODS
SUBJECT CODE : 09UBCT03

MAJOR : B. Sc (Computer Technology)   SEMESTER   : II
TIME   : 3 HOURS   MAX. MARKS: 75

SECTION A – (5 X 2 = 10)

Answer All the Questions:

1. Show that the iterative formula for finding the reciprocal of N is $x_{n+1} = x_n (2 - Nx_n)$.

2. Write down the condition for the convergence of Gauss – Seidal iteration scheme.

3. Distinguish between interpolation and extrapolation.

4. What are the errors in Trapezoidal and Simpson's rules of numerical integration?

5. Write Runge - Kutta's second order formula to solve $y' = f(x, y)$ with $y(x_0) = y_0$.

SECTION B – (5 X 4 = 20)

Answer All the Questions:

6. a) Solve the equation $x^3 + x^2 - 1 = 0$ for the positive root by iteration method, correct to 3 decimal places.

(OR)

   b) Find a positive root of $x^3 - 4x + 1 = 0$ by False position method. (perform 3 iterations)

7. a) Solve the following system by Gauss – Elimination method.
$$2x + 3y - z = 5$$
$$4x + 4y - 3z = 3$$
$$2x - 3y + 2z = 2$$

(OR)

   b) Solve the following system by Gauss – Seidal method, correct to 3 decimal places.
$$8x - 3y + 2z = 20$$
$$4x + 11y - z = 33$$
$$6x + 3y + 12z = 35$$

8. a) Using Newton's interpolation, find the value of y at $x = 1.05$ from the table given below.

x	1.0	1.1	1.2	1.3	1.4	1.5
y	0.841	0.891	0.932	0.964	0.985	1.015

(OR)

   b) Using Lagrange's formula, find y when $x = 2$, from the table given below.

x	0	1	3	4
y	5	6	50	105

9. a) Evaluate $\int_0^6 \dfrac{1}{1+x} \, dx$ using Trapezoidal rule.

(OR)

   b) Using Simpson's three – eighths rule, evaluate $\int_{-3}^{3} x^4 \, dx$.

...2...

10. a) Using Taylor method, compute $y(0.2)$ correct to 4 decimal places, given $y^1 = 1 - 2xy$ and $y(0) = 0$.

(OR)

b) Compute $y(0.1)$, given $y^1 + y + xy^2 = 0$, $y(0) = 1$, $h = 0.1$ using Runge-Kutta fourth order, correct to 4 decimals.

SECTION C – (3 X 15 = 45)

Answer any THREE Questions:

11. Assuming that a root of $x^3 - 9x + 1 = 0$ lies in the interval $(2,4)$, find the root by Bisection method.

12. Solve the following system by triangularization method.
$$x + y + z = 1$$
$$4x + 3y - z = 6$$
$$3x + 5y + 3z = 4$$

13. Find the first derivatives of the function tabulated below at $x = 50$ and $x = 56$, using Newton's method.

x	50	51	52	53	54	55	56
y	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

14. Evaluate the integral $\int_4^{5-2} \log_e x$ using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules, by dividing the range into 6 equal parts.

15. Using Adam's method, find $y(0.4)$ given $y' = \frac{xy}{2}, y(0) = 1, y(0.1) = 1.01$, $y(0.2) = 1.022$, $y(0.3) = 1.023$.

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