Roll No. | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 07

B.Sc.(Computer Science) (Sem.–5)

NUMERICAL ANALYSIS

Subject Code : BCS-501

M.Code : 72574

Date of Examination : 12-12-22

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt ANY FOUR questions.**

SECTION-A

1. Write briefly :

a) If $u = \frac{5xy^2}{z^3}$ and errors in x, y and z be 0.001. Compute the relative maximum error in u when $x = y = z = 1$.

b) If true value of a number is 36.25 and its absolute error is 0.002. Find the relative error and percentage error.

c) In the method of false position, state the formula for the first approximation of the root of given equation, where symbol have their usual meaning.

d) What is the difference between Gauss-Seidal and Jacobi's method?

e) Find the root of the equation $x^3 - x - 1 = 0$ lying between 1 and 2 up to first iteration using Bisection method.

f) Define Milne's predictor corrector method?

g) Find the unique polynomial P(x) of degree 2 or less such that

P(l) = 1, P(3) = 27, P(4) = 64

using Newton divided difference formula.

h) What is the formula for Simpson's rule?

i) State normal equations for fitting a second degree polynomial $y = a + bx + cx^2$.

j) Define Adams-Bashforth predictor corrector equations?

SECTION-B

2. Compare a real root of the equation:

$f(x) = 3x + \sin(x) - e^x = 0,\ x_0 = 0,\ x_1 = 1$

using Regula-Falsi Method.

3. Find the inverse of coefficient matrix of the given set of equations by Gauss-Jordan method with partial pivoting and hence solve the system.

$$x_1 + x_2 + x_3 = 1$$

$$4x_1 + 3x_2 - x_3 = 6$$

$$3x_1 + 5x_2 + 3x_3 = 4$$

4. Apply Gauss's forward formula to obtain $f(32)$ given that $f(25) = 0.2707$, $f(30) = 0.3027$, $f(35) = 0.3386$, $f(40) = 0.3794$.

5. Find the solution at x = 12.2 using Stirling's formula.

x	10	11	12	13	14
f (x)	0.23967	0.2806	0.31788	0.35209	0.38368

6. Using the Adams-Bashforth predictor-corrector equations, evaluate y (1.4), if y satisfies the following equation:

$$\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}$$

and $y(1) = 1$, $y(1.1) = 0.996$, $y(1.2) = 0.986$, $y(1.3) = 0.972$.

7. Given $y' = x^3 + y$, $y(0) = 2$, compute $y(0.2)$, $y(0.4)$ and $y(0.6)$ using the Runge-Kutta Method of fourth order.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.