

U.G. 5th Semester Examination - 2021

COMPUTER SCIENCE

[HONOURS]

Discipline Specific Elective (DSE)

Course Code : COM.SC-H-DSE-L-502

(Numerical Methods)

Full Marks : 60

Time : 2½ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP-A

Answer any **ten** of the following questions : 2×10=20

1. a) What is the criteria for the convergence of Newton Raphson method?
- b) Define backward difference with an example.
- c) Find the inverse of $A = \begin{pmatrix} 1 & 3 \\ 2 & 7 \end{pmatrix}$ by Gauss-Jordan method.
- d) State the Newtons backward formula for interpolation.
- e) What do you mean by absolute error relative error?
- f) State the advantages of Runge-Kutta method over Taylor series method.

[Turn Over]

- g) Write forward difference table for the following data:

x	10	20	30	40
y	1.1	2.0	4.4	7.9

- h) When is Gauss Elimination Used?
- i) Define interpolation.
- j) State the local error term in Simpson's 1/3 rule.
- k) When is Gauss Elimination Used?

GROUP-B

Answer any **four** of the following questions: 5×4=20

2. Find the missing term in the following data. 5

x	0	1	2	3	4
y	1	3	9	?	81

3. Evaluate $\int_0^1 (4x - 3x^2) dx$ taking 10 intervals by Simpson's one-third rule. 5
4. Using method of false position, find the real root of the equation $f(x)=x^3-3x-5=0$ up to 4 decimal places. 5
5. Establish second order Runge-Kutta method. 5

6. Solve the linear system of equations. 5

$$3x + 2y + 4z = 7$$

$$2x + y + z = 7$$

$$x + 3y + 5z = 2$$

by Factorization method.

GROUP-C

Answer any **two** of the following questions: 10×2=20

7. a) Find a real root of the equation $f(x)=x^3+x-5=0$ by the bisection method, correct up to three decimal place.

- b) Find the real root of the equation $x^2-5x+2=0$ by Newton-Raphson's method. 5+5=10

8. Solve the following equations by Jacobi method : 10

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

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

9. a) Using Euler's method, compute $y(0.5)$ for differential equation $dy/dx=y^2-x^2$, with $y=1$ when $x=0$.

- b) Given $dy/dx=y-x$ with $y(0)=2$, find $y(0.1)$ and $y(0.2)$ correct upto for decimal places, using Runge Kutta fourth order method. 5+5=10
