

C.U.SHAH UNIVERSITY

Winter Examination-2022

Subject Name: Numerical Techniques, C-Programming and MATLAB

Subject Code: 5SC03NTM1

Branch: M.Sc. (Physics)

Semester: 3

Date: 23/11/2022

Time: 11:00 To 02:00

Marks: 70

Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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SECTION – I

Q-1 Attempt the Following questions. (07)

- a. Define linear equation. **01**
- b. List the direct and iterative numerical methods for solving simultaneous linear equations. **02**
- c. What is the relation between Δ and E? **01**
- d. Find the value of Δu_x for the value of $\log x$. **01**
- e. Write the formula of Trapezoidal rule. **01**
- f. What are different rules of numerical integration? **01**

Q-2 Attempt all questions (14)

- a) Solve the following equation by Matrix inversion method. **07**
 $2x - 3y - z = 5$
 $3x + 2y + z = 10$
 $x - 5y + 3z = 10$
- b) Solve the systems of equations of **07**
 $x + y + z = 9$
 $3x + 2y - z = 10$
 $-2x + 3y - 4z = 1$
By gauss elimination method.

OR

Q-2 Attempt all questions (14)

- a) Fit a parabola of the form $y = ax^2 + bx + c$ to the following data by method of group averages. **07**

x	1	2	3	4
y	1.7	1.8	2.3	3.2

- b) Fit a straight line $y = ax + b$ to the following data by the method of moments. **07**



x	0	5	10	15	20	25
y	12	15	17	22	24	30

- Q-3 Attempt all questions (14)**
- a) Obtain the exact form of $f(x)$ by using the following data and hence find $f(6)$ and $f(11)$ using Newton forward method. **07**

x	0	1	2	3
f(x)	1	3	7	13

- b) Given the equation: $dx/dy = 2x^3 - 1$ with $y(1) = 2$, estimate $y(2)$ by Euler's method using (i) $h = 1.0$ and (ii) $h = 0.5$. **07**

OR

- Q-3 Attempt all questions (14)**
- a) Use Lagrange's formula to find the form of $f(x)$, given **07**

x	0	2	3	6
f(x)	648	704	729	792

- b) Solving the following set of equations using cramer's rule: **07**
- $$2x + 3y + 2z = 14$$
- $$5x + y + z = 10$$
- $$x + 5y + 3z = 20.$$

SECTION – II

- Q-4 Attempt the Following questions. (07)**
- What are M-files? **01**
 - Write the command for integration in MATLAB. **01**
 - What is structure? **01**
 - Define: Union. **01**
 - What is variable? **01**
 - Write a command for sum operation in MATLAB **01**
 - What is pointer? **01**

- Q-5 Attempt all questions (14)**
- Discuss Array operations with examples in MATLAB. **03**
 - How to use plots and Graphs function in MATLAB with examples. **04**
 - Write a program of Newton Raphson method. **07**

OR

- Q-5 Attempt all questions (14)**
- Briefly Explain array of structure with example. **07**
 - Write a short note on pointer. **07**

- Q-6 Attempt all questions (14)**
- Explain in details differentiation and integration with example using MATLAB **06**
 - Explain in details matrices operation in MATLAB with example. **04**
 - How to compute Taylor series of e^x about the point $x=2$ in MATLAB **04**

OR

- Q-6 Attempt all Questions (14)**
- Explain various operations performed on file. **07**
 - Write a short note on structure. **07**

