Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Winter Examination-2015

Subject Name : Numerical Analysis and Computational Physics

Subject Code : 5SC03PHC1 **Branch : M. Sc. (Physics)**

Semester : 3 **Date : 01/12/2015** **Time : 02:30 To 05:30** **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.

SECTION – I

Q-1 **Attempt the Following questions** **(07)**

a. What is least square fitting? **01**
b. What is the roots of the equation? **01**
c. What is Graphical Method? **01**
d. Write mathematical expression of Lagrange's interpolation formula. **01**
e. Write different types of algebraic equations. **01**
f. Give one example of polynomial equation. **01**
g. What is trial and error method? **01**

Q-2 **Attempt all questions** **(14)**

a. Given the values **07**

x	5	7	11	13	17
y	150	392	1452	2366	5202

Evaluate f(9) using Newton's divided difference formula.

b. (1) Solve the equation : $2x^3+x^2-13x+6=0$. **07**
(2) Solve the equation : $3x^3-4x^2+x+88=0$, one root being $2+7\sqrt{i}$.

OR

Q-2 **Attempt all questions** **(14)**

a. Solve the following equations by Cramer's rule. **07**
$3x+y+2z=3$, $2x-3y-z=-3$, $x+2y+z=4$

b. The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface. **07**

x=height	100	150	200	250	300	350	400
y=distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when x=218 feet using Newton's forward interpolation formula.

Q-3 **Attempt all questions** **(14)**

a. Given that **07**

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find dy/dx and d^2y/dx^2 at x=1.1.

b. Derive formula for numerical integration. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (1) Trapezoidal rule, (2) Simpson's 1/3 rule and (3) Simpson's 3/8 rule. **07**

OR

Q-3 **a.** Solve the following equations by the Gaussian Elimination Approach. **07**

3x+2y+z= 11, 2x+3y+z= 13, x+y+4z=12

b. The corresponding values of x and y are given by the following table. Fit a parabola of the form $y=a+bx+cx^2$, by the method of group averages. **07**

x	87.5	84	77.8	63.7	46.7	36.9
y	292	283	270	235	197	181

SECTION – II

Q-4 **Attempt the Following questions** **(07)**

a. Write full name of MATLAB. **01**

b. Write main parts of the computer. **01**

c. What is computer algorithms? **01**

d. What is Operating System? **01**

e. What is Programming language? **01**

f. Define Computer. **01**

g. Write program of 'simple x-y plots' in MATLAB. **01**

Q-5 **Attempt all questions** **(14)**

a. Discussion the relation between computation and science. **05**

b. Discuss computer languages. **05**

c. Discuss the emergence of the modern computers. **04**

OR

Q-5 **Attempt all questions** **(14)**

a. Differentiate ancient and digital computers. **05**

b. Discuss Computer language. **05**

c. Discuss compilers. **04**

Q-6 **Attempt all questions** **(14)**

a. Discuss array operations with example in MATLAB. **05**

b. How to solve algebraic equations in MATLAB? Discuss with example. **05**

c. How to perform Matrices operation in MATLAB? **04**

OR

Q-6 **Attempt all Questions** **(14)**

a. What is M-Files? Discuss script M-files. **05**

b. Discuss with example how to use 'plots and graphs' function in MATLAB. **05**

c. Discuss 'Loops' command in MATLAB. **04**