MCA/D07

Computer Oriented Numerical and Statistical Methods

MCA -105

Time : 3 Hours **MM:50**

Note:- Question no 1 is compulsory. In addition to compulsory question Attempt Four more questions by selecting One Question from each unit.

UNIT-I

1(a) Discuss various types of computational errors with one example each. 5

(b) Assuming that computer can handle only 4 digit mantissa, calculate the absolute and relative errors in the following operations where p=0.02455 and q=0.001756

(i) pxq **(ii)** $\frac{p-q}{p+q}$ **5**

2(a) Write a program in C to splve the equation
$x^3 - 4x^2 + x + 6 = 0$
Using Newton-Raphson method.

(b) Solve the equation $x^2 - 5x + 6 = 0$ **using Bisection method.**

3 Illustrate Gauss elimination algorithm and apply it to solve the following system of equation

$$2x_1 + 3x_2 + 4x_3 = 5$$
$$3x_1 + 4x_2 + 5x_3 = 6$$
$$4x_1 + 5x_2 + 6x_3 = 7$$

10

UNIT-II

4(a) Using Lagrangian interpolation formula, find the values of y at x=1.25 and x=1.45, given the following set of data.

X	**:**	**1.20**	**1.30**	**1.40**	**1.50**
Y	**:**	**1.063**	**1.091**	**1.119**	**1.145**

5

(b) The velocity v (km/min.) of a moped which starts from rest, is given at fixed intervals of time / (min) as follows:

t	**:**	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**
v	**:**	**10**	**18**	**25**	**29**	**32**	**20**	**11**	**5**	**2**	**0**

Estimate approximately the distance covered in 20 minutes using Simpson rule.

5

5(a) **Use Trapezoidal rule to evaluate** $\int_0^1 x^3\,dx$ **considering five sub-intervals.** **5**

(b) **Find the cubic polynomial which takes the following values:**

x	**:**	**0**	**1**	**2**	**3**
f(x)	**:**	**1**	**2**	**1**	**10**

Hence or otherwise evaluate f(4) **5**

6(a) **Find f'(0.1) and f^n (0.1) from the following table of values :**

x	**:**	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**
y= f(x)	**:**	**10**	**19**	**40**	**79**	**142**

5

(b) **Find by Taylor's series method, the values of yat x=0.1 and x=0.2 to five places of decimals from**

$$\frac{dy}{dx} = x^2 y - 1,\ y(0) = 1$$

5

7(a) **Construct the table of differences for the data below:**

x	**:**	**0**	**1**	**2**	**3**	**4**
f(x)	**:**	**1.0**	**1.5**	**2.2**	**3.1**	**4.6**

Evaluate $\Delta^3 f(2)$. **5**

(b) **Evaluate** $\Delta^2 \left[\frac{5x+12}{x^2+5x+16}\right]$ **5**

UNIT-III

8(a) **The following figure relate to the production (in kg) ofthree varieties ofwheat A,B and C used in 15 plots:**

Wheat Variety	Yiels (in Kg)
A	14 17 16 16
B	15 11 13 15 13 14
C	18 16 18 19 15

Test wheather there is any significant difference in the production of three varieties. **5**

(b) **Fit a geometric curve** $y=ax^b$ **to the following data:**

x :	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**
y :	**38**	**6**	**0**	**-5**	**-41**	**130**	**300**

9(a) **A random sample of 10 boys had the following I.Q.s:**
70, 120, 110, 101, 88, 83, 95, 98, 107, 100.
Do these data support the assumption ofa population mean I.Q. of 100? Find a reasonable range in which most of the mean I.Q. values ofsamples of 10 boys lie. 5

(b) **A correlation coefficient of 0.72 is obtained from a sample of 29 pairs of observations. Can the sample be regarded as drawn from a bivariate normal population in which true correlation coefficient is 0.8? 5**

9 **Write short notes on the following:**
- **(i) Contingency table**
- **(ii) Time Series analysis**
- **(iii) Cyclic movement 10**