Seat No. : _____

# XU-130

**April-2013**

## Five Year M.Sc. (CA & IT) Integrated (K.S.) (Sem.-IV)

## S.Y. M.Sc.

## Computer Oriented Numerical Methods

**Time : 3 Hours]** **[Max. Marks : 100**

1. (a) Any **two** : **14**

(1) Solve the following system of equations using Gauss Elimination Method :

$2x + y + 3z = 1$

$2x + 6y + 8z = 3$

$6x + 8y + 18z = 5$

(2) Solve the following system of equations using Gauss Jacobi Method :

$10x + 2y + z = 9$

$x + 10y - z = -22$

$-2x + 3y + 10z = 22$

(3) Solve the following system of equations using Gauss Seidel Method :

$5x - 2x_2 + 3x_3 = -1$

$-3x_1 + 9x_2 + x_3 = 2$

$2x_1 - x_2 - 7x_3 = 3$

(b) Answer the followings : **6**

(1) Convert $(1A2C)_{16}$ Number into decimal number.

(2) Represent $(118)_{10}$ into 1's complement.

(3) Explain transcendental number system with example.

2. (a) Answer the followings : **14**

(1) Fit a parabola curve to the following data :

| $x$ | –2 | –1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | –72 | –46 | –12 | 35 | 93 |

(2) Fit an exponential curve $y = ab^x$ to the following data :

| $x$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| y | 1 | 1.2 | 1.8 | 2.5 | 3.6 | 4.7 | 6.6 | 9.1 |

(b) Answer the followings : **6**

(1) Let $x = 0.00458529$, find the absolute error if $x$ is truncated to three decimal digits.

(2) Divide 0.9998 E – 5 by 0.1000 E 99.

3. (a) Give geometrical interpretation of Newton Raphson method. **8**

**OR**

Compare Bisection method, False Position method and Newton-Raphson method.

(b) Find one of the roots of the non-linear equation by Bisection method (correct upto three decimal places) : **7**

$x^3 - 4x - 10 = 0$

(c) Given the following table : **5**

| $x$ | 0.5 | 0.75 | 1.00 | 1.25 | 1.50 |
|---|---|---|---|---|---|
| $y = f(x)$ | 0.13 | 0.42 | 1.00 | 1.95 | 2.35 |

find f ' (0.75)

4. (a) Answer the followings : **16**

(1) Show the derivation of Newton's forward difference polynomial.

(2) Given the table of values as

| $x$ | 2.5 | 3.0 | 4.5 | 4.75 | 6.0 |
|---|---|---|---|---|---|
| y ($x$) | 8.85 | 11.45 | 20.66 | 22.85 | 38.60 |

find y(3.5)

(b) Derive the formula of Lagrangian Polynomial. **4**

5. (a) Derive the formula for Simpson's 3/8$^{th}$ rule. **8**

(b) $\int_0^2 \frac{1}{1+x^2}\,dx$ by trapezoidal rule with h = 0.25. **6**

(c) Using Runge Kutta method of second order, solve the following :

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

for $x = 0.1, 0.2, 0.3$ & $0.4$ given that $y = 1$ when $x = 0$. **6**

**OR**

(a) Give geometrical interpretation of Range Kutta method of forth order. **8**

(b) Using Euler's formula solve the following :

$\frac{dy}{dx} = x + y^2$ for $x = 1.1, 1.2, 1.3$ given that $y = 1$ when $x = 1$. **6**

(c) Using Simpson's $\frac{1}{3}$ rule solve the following :

$\int_2^4 (x^2 + 2x)\, dx$ using step size 0.5. **6**