Seat No. : _____

AK-123

April-2016

M.Sc., Sem.-IV (CA & IT)

Computer Oriented Numerical Methods

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

Instruction : Non-programable scientific calculator can be used.

1. Attempt any **two** : **20**

(1) Solve the system of equations by Gauss elimination method with partial pivoting.

$$x + y + z = 7$$
$$3x + 3y + 4z = 24$$
$$2x + y + 3z = 16$$

(2) Solve the system of equations by Gauss Jordon method.

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

(3) Solve the system of equations by Gauss Seidal method.

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$2x + 2y + 10z = 14$$

2. Attempt any **two** : **20**

(1) Fit a second degree parabola to the following data :

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

(2) Predict y at $x = 3.75$ by fitting a power curve $y = ax^6$ to the given data :

x :	1	2	3	4	5	6
y :	2.98	4.26	5.21	6.10	6.80	7.50

(3) Attempt the following :

(a) Add .6925E5 to .9321E4

(b) Subtract .8231E-3 from .9990E-3

(c) Multiply .4142E2 by .1213E3

(d) Find the absolute and relative error of rounding to 3 decimal places of $.000634810^{-2}$.

(e) Find the absolute and relative error of function to 3 decimal places $.008459 \times 10^3$.

3. Attempt any **two**. **20**

(1) Find a root that lies between 2 and 3 of the equation $x^3 - 4x - 9 = 0$, using the bisection method correct to three decimal places.

(2) The elevation above a datum line of seven points of a road are given below :

x :	0	300	600	900	1200	1500	1800
y :	135	149	157	183	201	205	193

Find the gradient of the road at the middle point.

(3) Give geometrical interpretation of False position method.

4. Attempt any **two** : **20**

(1) Using Newton's divided difference formula evaluate f(8) and f(15).

x :	4	5	7	10	11	13
y :	48	100	294	900	1210	2028

(2) Using appropriate formula of Interpolation find f(22).

x :	20	25	30	35	40	45
f(x) :	354	332	291	260	231	204

(3) The following table gives the value of x and y, find the value of x corresponding to y = 12 using Lagrange's formula.

x :	1.2	2.1	2.8	4.1	4.9	6.2
y :	4.2	6.8	9.8	13.4	15.5	19.6

5. Attempt the following : **20**

(A) Evaluate $\int_0^2 e^{-x^2}\,dx$ by using trapezoidal rule. (take h = 0.20).

(B) Obtain numerically the solution of $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 0.5$

Using Euler's method to find y at $x = 0.1$, $x = 0.2$ and $x = 0.3$.

OR

(A) Evaluate $\int_0^9 \frac{dx}{1 + x^3}$ by using Simpson's $\frac{3}{8}$ rule.

(B) Using Runge-Kutta 4^{th} order method, find the solution of the following differential equation $\frac{dy}{dx} = x + y$

for $x = 0.1$, 0.2 and 0.3. Given that $y = 0$ when $x = 0$.

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