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M.C.A. (Sem. II) (Main) (New Scheme) Examination, July - 2010
Computer Oriented Numerical & Methods
(MCA-202)

Time : **3** Hours]

[Maximum Marks : **80**
[Min. Passing Marks : **32**

Attempt all questions.
Marks of questions are indicated against each question.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. _____ **Log Table** _____   2. _____ **Nil** _____

1 Answer the following questions :

(a) Find the value of $3x$ and $x + x + x$ when $x = 0.5654E2$.

(b) What are zeroes of a single transcendental equation ?

(c) Find any one interval in which a root of the following equation lies.

$$x^3 + 3x^2 - 1 = 0$$

(d) Give Newton's forward difference interpolation formula.

(e) The dominant error in Trapezoidal rule is _____

(f) Newton Raphson method to find roots is more suitable to the functions when root is _____.

(g) An approximate value of x is 3.142857 and its true value is 3.1415926. Find the absolute error and relative error.

(h) Subtract 0.6578E4 from 0.6699E5 using normalized floating point number arithmetic.

(i) The order of convergence of Newton Raphson method is _____

(j) The Newton's divided difference interpolation formula is applicable when the tabulated values are _____.

$1 \times 10 = 10$

2 Answer the following questions :

(a) Use secant method to approximate to within 10^{-3} one root of the following equation in the given interval :

$$x^3 - 2x - 5 = 0 \ (2, 3)$$

(b) Find the polynomial which passes through $(0, -12), (1, 0), (3, 6)$ and $(4, 12)$ using Lagrange's interpolation formula.

(c) Discuss the various errors in numerical computations.

(d) Develop an algorithm to fit a straight line for a given set of data.

(e) Discuss concept of ill conditioned system of equations.

$3 \times 5 = 15$

3 Answer the following questions :

(a) Discuss the different errors in numerical computations.

(b) Give algorithm for finding a root using Newton Raphson method.

(c) Give algorithm for Runge Kutta 4th order method.

(d) Give algorithm for Gauss elimination method of solving a system of linear equations.

(e) Use Runge Kutta 2nd order method find value of y when $x = 0.2$ in steps of 0.1 for the following differential equation. Given is $x_0 = 0, y_0 = 1$.

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

$4 \times 5 = 20$

4 Answer the following questions :

(a) Solve the following system of linear equations (upto 4 iterations only) using Gauss Seidel method :

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110$$

(b) Use Simpson's 1/3 rule to find the approximate are of the cross-section of a river 80 m wide, the depth (in meters) at a distance x from one bank being given by the following table :

x	0	10	20	30	40	50	60	70	80
y	0	4	7	9	12	15	14	8	3

$10 \times 2 = 20$

5　Solve the following system of linear equations using Gauss elimination method :

$$2x_1 + x_2 + x_3 = 10$$
$$3x_1 + 2x_2 + 3x_3 = 18 .$$
$$x_1 + 4x_2 + 9x_3 = 16$$

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OR

Interpolate with the help of Gauss's backward formula the value of $f(56)$ from the following table :

x	10	20	30	40	50	60
$f(x)$	12	15	20	27	39	52

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