(i) Printed Pages: 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 0 9 3 1

Exam. Code : 0 0 2 9

Bachelor of Computer Applications 3rd Semester

(2122)

COMPUTER ORIENTED NUMERICAL METHODS

Paper : BCA-16-304

Time Allowed : Three Hours] **[Maximum Marks : 65**

Note :— Attempt **FIVE** questions in all, including Q.No. **9** in Section-E, which is compulsory and taking **ONE** each from Sections-A, B, C & D.

SECTION—A

1. What is normalized floating point number ? Explain various arithmetic operations with Normalized Floating Point Numbers, by taking examples. 13

2. (a) How a floating point number is stored in the memory of a computer ? Explain by taking suitable example.
   (b) Differentiate between 1's complement representation and 2's complement representation of numbers by taking examples. 7,6

SECTION—B

3. (a) Solve $x^3 - 5x + 3 = 0$ by Regula-Falsi Method.

   (b) Use the bisection method to approximate the value of $\sqrt{3}$ given that it lies in the interval [1, 2]. 7,6

4. (a) Solve the following system of linear simultaneous equations by Gauss-Elimination method :

$$2x + 2y + z = 12$$

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

$$5x + 10y - 8z = 10$$

   (b) Solve the following system of linear simultaneous equations by Gauss-Jordan method :

$$2x + y + 6z = 9$$

$$8x + 3y + 2z = 13$$

$$x + 5y + z = 7$$ 7,6

SECTION—C

5. (a) Use Lagrange and the divided difference formula to calculate F(3) from the following table :

X :	0	1	2	4	5	6
F(x) :	1	14	15	5	6	19

   (b) Given :

x:	1	2	3	4	5	6	7	8
$f(x)$:	1	8	27	64	125	216	343	512

   Find f(7.5) using Newton's Backward difference formula. 6,7

6. (a) Evaluate the value of the integral $\int_0^1 \frac{x\,dx}{1+x^2}$ using Simpson's rule with three and six points.

(b) Find the minimum number of intervals required to evaluate the following integral with an accuracy of 10^{-5} using Simpson's 1/3 Rule. $\int_0^1 \frac{1}{1+x}dx$ 6,7

SECTION—D

7. Use the Runge-Kutta 4th order method with step size 0.5 to solve the initial value problem :

$y' = \frac{3x}{y} - xy$, $y(0) = 2$ over the interval [0, 1]. 13

8. What do you mean by approximation of a function by a Taylor's series ? Find the Taylor polynomial of degree 2, $T_2(x)$ for $f(x) = \frac{1}{(2+x)}$ centered at $x_0 = 0$. 13

SECTION—E (Compulsory Question)

9. (a) Give definition of numerical analysis.

(b) Find the relative error, absolute error and percentage error, if $\frac{2}{3}$ is approximated to 0.6667.

(c) What is the order of convergence of Secant Method ?

(d) What is meant by numerical integration ?

(e) What is the relation between Divided Differences and Forward Differences in interpolation ?

(f) What is pivoting in the solution of simultaneous linear equations ? Explain with an example. 5×2, 3