

(i) Printed Pages: 4

Roll No. ....

(ii) Questions : 9

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Exam. Code : 

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**Bachelor of Computer Applications 3<sup>rd</sup> 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 :

$$x: \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$$

$$f(x) : 1 \quad 8 \quad 27 \quad 64 \quad 125 \quad 216 \quad 343 \quad 512$$

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 :

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

8. What do you mean by approximation of a function by a Taylor's series ? Find the Taylor polynomial of degree 2,

$$T_2(x) \text{ for } f(x) = \frac{1}{(2+x)} \text{ centered at } x_0 = 0. \quad 13$$

### 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.  $5 \times 2, 3$