(i) **Printed Pages : 2**   Roll No. ....

(ii) **Questions** : 9   **Sub. Code :** 1 7 9 3 0

Exam. Code : 0 0 2 9

Bachelor of Computer Applications 3rd Semester

(2124)

INFORMATION SYSTEM DESIGN AND

IMPLEMENTATION

Paper : BCA-16-303

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

Note :— The students are required to attempt *one* question each from Sections A to D and the compulsory question.

SECTION—A

1. (a) Define System. Discuss its characteristics.   7

    (b) Explain roles of a system analyst.   6

2. Explain System Development Life Cycle along with block diagram in detail.   13

SECTION—B

3. Explain System Planning and Initial Investigation process in detail.   13

4. (a) Discuss Decision Tree and Decision Table as structured analysis tools. 7

(b) Concept of Data Dictionary. 6

SECTION—C

5. Briefly explain the steps in feasibility analysis. Discuss technical & economic feasibility study. 13

6. (a) What do you mean by structured design ? Explain functional decomposition as design methodology. 7

(b) What is Quality Assurance ? Explain its various levels for System development. 6

SECTION—D

7. Discuss system implementation and maintenance activities in detail. 13

8. (a) What do you mean by user training ? Discuss its elements. 7

(b) Discuss procedures for hardware and software selection. 6

(Compulsory Question)

9. (a) What is DFD ? 2

(b) What do you mean by audit trail ? 2

(c) Logical and Physical Design. 2

(d) Explain fact finding techniques. 2

(e) On-site Observation. 2

(f) Differentiate Structured and Un-structured Interviews. 3

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

(ii) Questions   : 9   **Sub. Code :** `1 7 9 3 1`
                        Exam. Code : `0 0 2 9`

Bachelor of Computer Applications 3rd Semester

(2124)

COMPUTER ORIENTED NUMERICAL METHODS

Paper : BCA-16-304

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

Note :—Attempt **FIVE** questions in all, including Question No. **9** in Section–E which is compulsory and attempt **ONE** question each from Sections–A, B, C and D.

SECTION—A

1. (a) The roots of $x^2 + 83.4x + 1 = 0$ are approximately $x_1 = -0.01199213$ and $x_2 = -83.38800785$. Suppose now that you work under four-digit rounding arithmetic. Calculate x_1 using the following two different formulas :

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ and } x_1 = \frac{-2c}{b + \sqrt{b^2 - 4ac}}.$$

Compute the relative error obtained by the two formulas. Explain why the second formula gives a more accurate answer than the first one.

(b) What is error propagation ? Illustrate the propagation of errors with a suitable method and examples.   6,7

2. How is floating point number stored in the memory of computers ? What are the factors that affect their accuracy and range ? With the help of suitable example, show that associative law of floating point addition may not be valid in numerical computations.

13

SECTION—B

3. Use Newton's method and the Bisection method to approximate the value of $\sqrt{2}$ to within 10^{-4}. Do this in two parts :

(a) Use Newton's method with an initial guess $p_0 = 1$. How does this compare with the bisection method, in terms of number of iterations required ?

(b) Use the Bisection method with initial intervals as [1, 2]. How does this compare to the Newton's method from part (a) ?

13

4. Given the initial guess $(x_1^{(0)}, x_2^{(0)}, x_3^{(0)}) = (0, 0, 0)$. Use Gauss-Seidel method to find the first three approximations $(x_1^{(1)}, x_2^{(1)}, x_3^{(1)})$ of the solution to the system of equations $Ax = b$, where

$$A = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 1 & -1 \\ 3 & 2 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}.$$

13

SECTION—C

5. Suppose we know the following values of a function F : F(0) = 0, F(1) = 2, F(2) = 8 :

   (a) Write down the divided differences F[0], F[0, 1] and F[0, 1, 2].

   (b) Write down the forward-differences $\Delta f(x_0)$, $\Delta^2 f(x_0)$.

   (c) Write down the appropriate Newton's interpolating polynomial. What is the order of the interpolating polynomial ?   4,4,5

6. Define the concept of numerical integration. Evaluate

   $$I = \int_0^1 (1/(x^3 + 10)) \cdot dx \text{ using :}$$

   (a) Trapezoidal rule, and

   (b) Simpson's rule with 3 and 5 points.   6,7

SECTION—D

7. Applying Euler's method and Runge-Kutta method, find the value of y when x = 0.3. Given that :

   $$\frac{dy}{dx} = x - y \text{ and } y(0) = -1.$$ 13

8. What is meant by approximation of a function by using Chebyshev's series ? Use this method to approximate the series expansion of sin(x) up to three digits accuracy.   13

SECTION—E
(Compulsory Question)

9. (a) Differentiate between 1's complement representation and 2's complement representation of numbers by taking examples.

(b) Find order of convergence of False-Position method.

(c) Differentiate between divided and backward difference table with examples.

(d) Explain what is a predictor-corrector method. Explain what it means for a predictor-corrector method to be stable. Discuss the stability and convergence of predictor-corrector methods.   3×3,4

Bachelor of Computer Applications 3rd Semester

(2124)

DATA STRUCTURES

Paper : BCA-16-305

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

Note :— Attempt *five* questions in all by selecting *one* question from each unit. Entire Question Number IX is compulsory.

UNIT—I

I. (a) What is Data Structure ? Describe the basic operations of Data Structure.

(b) What is an Array ? Differentiate between row major and column major representation of 2D Array in memory. 7,6

II. (a) Write algorithms to insert and delete elements in a Linear Array.

(b) What is a Stack ? How is it represented in memory ? Name few applications of Stack. 7,6

UNIT—II

III. (a) Write an algorithm to insert a new node at the beginning of a Linked List.

  (b) Write an algorithm to search an element from a Linked List. 7,6

IV. (a) Describe Doubly Linked List. Write an algorithm to traverse a Doubly Linked List.

  (b) Describe Circular Linked List. Write an algorithm to delete an item from a Circular Linked List. 7,6

UNIT—III

V. (a) What is a Binary Tree ? How is it different from a Binary Search Tree ? Explain with examples.

  (b) Write down the algorithm for inorder traversal of binary tree. 7,6

VI. (a) Explain the main terminology of Graph. How is a Graph represented in memory ?

  (b) Explain Depth First Search algorithm with suitable example. 7,6

UNIT—IV

VII. (a) What is linear search ? Explain with an example. Also explain the best case and worst case of linear search.

(b) What is Binary Search ? Write all stages of searching an item 55 in the data list-33, 77, 88, 44, 22, 55, 11, 99.

7,6

VIII.(a) Explain steps for sorting the data list-13, 71, 82, 24, 52, 75, 11, 89 using Quick Sort procedure.

(b) How does Merge Sort algorithm work ? Explain it with an example.

7,6

(Compulsory Question)

IX. Write short answers :

(i) What is Time complexity ?

(ii) List any two applications of Queue.

(iii) Differentiate between linear and non-linear data structures.

(iv) What are the drawbacks of using Linked List ?

(v) How do you find the height of a node in a Tree ?

(vi) Name any four algorithms which work on Divide and Conquer Principle.

(vii) Describe the complexity of Bubble Sort. $6 \times 2 + 1 = 13$

(b) What is Binary Search ? Write all stages of searching an item 55 in the data list-33, 77, 88, 44, 22, 55, 11, 99.

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