Roll No. .....

Total No. of Questions : **9]** [Total No. of Printed Pages : **4**

(2042)

BCA (CBCS) RUSA IInd Semester Examination

3746

DATA STRUCTURES

Paper : BCA–0204

Time : 3 Hours] **[Maximum *Marks : 70***

Note :– Attempt *five* questions in all, selecting *one* question from each Unit–I, II, III and IV. Q. No. **1** (Part–A) is compulsory.

Part–A
(Compulsory Question)

1. (A) Attempt all Parts.

Fill in the blank spaces with most appropriate words :

(i) In general, the index of the first element in an array is .....0..... .

(ii) In a stack, if a user tries to remove an element from an empty stack it is called underflow

(iii) A linear collection of data elements where the linear node is given by means of pointer is called Linkedlist

State whether the statement is True *or* False :

(iv) Merge sort is preferred for arrays over linked lists. (True/False)

(v) Quicksort algorithm is the fastest among all the sorting algorithms ? (True/False)

Answer the following MCQ's by selecting the most appropriate option :

(vi) What are the advantages of arrays ?

(a) Objects of mixed data types can be stored.

(b) Elements in an array cannot be sorted.

(c) Index of first element of an array is 1.

(d) Easier to store elements of same data type.

(vii) What is the value of the postfix expression 6 3 2 4 + – * ?

(a) 1 (b) 40

(c) 74 (d) –18

(viii) A data structure in which elements can be inserted or deleted at/from both ends but not in the middle is ?

(a) Queue (b) Circular queue

(c) Dequeue (d) Priority queue

(ix) Which data structure is used to convert an infix notation to prefix notation ?

(a) Stack (b) Queue

(c) B-Trees (d) Linked-list

(x) The pre-order traversal of a binary tree is A, B, E, C, D. The inorder traversal of the same binary tree is B, E, A, D, C. The level order sequence for the binary tree is .....

(a) A, C, D, B, E

(b) A, B, C, D, E

(c) A, B, C, E, D

(d) D, B, E, A, C 1×10=10

(B) Answer the following in **25** to **50** words :

(i) Why do we need data structures ? Discuss in brief.

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

(iii) What is the principle of Queue ? Also discuss the different types of Queues.

(iv) What is meant by Binary Search Tree ?

(v) What is Doubly Linked List ? Give example. 5×4=20

Unit–I

2. (a) Explain Time and Space complexity in the analysis of Algorithms.

(b) Describe rate of growth of complexity with n. 5,5

3. (a) What is Linear Array ? Write an algorithm to insert an element at K^{th} position in a linear array with N elements, where $K \leq N$.

(b) Give the formula for address calculation in arrays. 7,3

Unit–II

4. (a) What is a Linked List ? Give the algorithm to traverse a Linked List.

(b) What are the advantages of Array over Linked List ? 7,3

5. (a) Explain different types of Linked Lists.

(b) Write an algorithm to delete a node from Linked List. 4,6

Unit–III

6. Write the algorithms of PUSH and POP operations on Stacks. 10

7. (a) Discuss the working of QUICKSORT technique to sort an array with a proper example.

(b) Give the algorithm to insert a new element in the Queue. 5,5

Unit–IV

8. Discuss the various methods for tree traversal. Also give the algorithm for preorder tree traversal. 10

9. (a) Discuss the bubble sort technique of sorting and also give its complexity.

(b) What is Linear Search ? Give its algorithm and complexity. 5,5