CS/BCA/ODD/SEM-3/BCA-302/2017-18

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Paper Code : BCA-302

DATA STRUCTURE WITH C

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :   10 × 1 = 10

   i)   Prefix notation is also known as

      a)   reverse polish notation

      b)   reverse notation

      c)   polish reverse notation

      d)   polish notation.

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ii) The searching an element in a hash table of size m with n keys requires

a) $O(n)$ comparisons

b) $O(m/n)$ comparisons

c) $O(m)$ comparisons

d) $O(n/m)$ comparisons.

iii) The complexity of linear search algorithm is

a) $O(n)$

b) $O(\log n)$

c) $O(n^2)$

d) $O(n \log n)$.

iv) The best data structure to see whether an arithmetic expression has balanced parenthesis is a

a) stack

b) queue

c) tree

d) list.

v) The sparse matrix is a matrix whose

a) most of the elements are non-zero

b) most of the elements are zero and half of the elements are non-zero

c) half of the elements are zero

d) none of these.

vi) The postfix notation is also known as

   a)   polish notation

   b)   reverse polish notation

   c)   reverse notation

   d)   none of these.

vii) For any non-empty binary tree T, if n is the number of nodes and e is the number of edges, then the relation between e and n is

   a) $e = n - 1$ b) $e = n + 1$

   c) $e + 1 = n$ d) $e = n.$

viii) When determining the efficiency of algorithm the time factor is measured by

   a)   counting microseconds

   b)   counting the number of key operations

   c)   counting the number of statements

   d)   counting the kilobytes of algorithm.

ix) A data structure where elements can be added or removed at either end but not in the middle is

   a) linked list   b) stack

   c) queue   d) deque.

x) Complexity expressed in O-notation is

   a) lower bound

   b) upper bound

   c) middle between (a) and (b)

   d) none of these.

xi) When the malloc() function returns NULL value it means

   a) memory is not allocated

   b) memory is allocated but no data entered

   c) both (a) and (b)

   d) none of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Write a C function to implement 'PUSH' and 'POP' operations in a stack.   2½ + 2½

3. Convert the following infix expression into postfix form by using stack :

$$a + b * c - (d - e * f) / g$$

4. What are the advantages of linked list over array ? What are the disadvantages over array ?   2½ + 2½

5. What is B–tree ? What is the difference between a B–tree and a B+tree ?   3 + 2

6. What is dequeue ? What is the advantage of dequeue over ordinary queue ?   3 + 2

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following.   3 × 15 = 45

7.   a)   What are the differences between general tree and a binary tree ?   2

   b)   Prove that the height h of a binary tree T is $h = \log_2 (n + 1)$.   3

   c)   Construct a B–tree of order 5 form the following key values :   5

   á, ġ, í, b, ḱ, d, h, m̄, j, é, ś, i, ŕ, x, ć, l, ń, t, u, p

   d)   What is hashing ? How is collision problem solved in hashing ?   1 + 4

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8. a) Explain with an example the heap sort algorithm.

   b) Write an algorithm for this heap sort.

   c) Find the time complexity of the above algorithm.

   5 + 5 + 5

9. Write the functions for the following :

   a) Insert a node after a particular node in singly linked list.

   b) Reverse display of the list in doubly linked list.

   c) Physically reverse the singly linked list.   5 + 5 + 5

10. a) What is an adjacency matrix representation of a graph ?

    b) Prove that maximum number of nodes on level i of a binary tree is 2^{i-1}, $i \geq 1$.

    c) What is the difference between recursion and iteration ?

    d) What will be the complexity for the following operations—quick sort, binary search, selection sort ?

    5 + 3 + 2 + 5

11. Write short notes on any *three* of the following : 3 × 5

    a)   AVL tree

    b)   Threaded binary tree

    c)   Search algorithm of BST

    d)   Priority queue

    e)   ADT.

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