

March 2022
B.Tech. (CE) - 3rd Semester
Data Structures and Algorithms (PCC-CS-301)

Time: 90 Minutes

Maximum Marks: 25

Note:

- It is compulsory to answer all the questions (1.5 marks each) of Part A in short.
- Answer any three questions from Part B in detail.
- Different sub-parts of a question are to be attempted adjacent to each other.

Part A

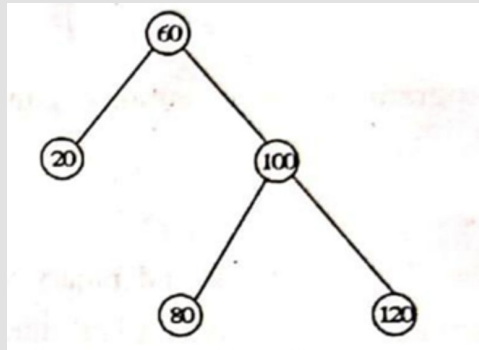
- Q1** (a) The postorder traversal of a binary tree is 8, 9, 6, 7, 4, 5, 2, 3, 1. The inorder traversal of the same tree is 8, 6, 9, 4, 7, 2, 5, 1, 3. The height of a tree is the length of the longest path from the root to any leaf. The height of the binary tree above is _____? (1)
- (b) The following function reverse() is supposed to reverse a singly linked list. There is one line missing at the end of the function. (1)

```
1  /* Link list node */
2  struct node{ int data; struct node* next;};
3
4  /* head_ref is a double pointer which points
5     to head (or start) pointer of linked list */
6
7  static void reverse(struct node** head_ref){
8
9      struct node* prev = NULL;
10     struct node* current = *head_ref;
11     struct node* next;
12     while (current != NULL) {
13         next = current->next;
14         current->next = prev;
15         prev = current;
16         current = next;
17     }
18
19     /*ADD A STATEMENT HERE*/
20 }
```

What should be added in place of "/*ADD A STATEMENT HERE*/", so that the function correctly reverses a linked list.

- (c) What is a AVL Tree? (1)
- (d) What is priority Queue? (1)

- (e) How the selection of a particular data structure is done to solve a problem? (1)
- (f) What do you mean by best, average and worst case of an algorithm? (1)
- (g) Consider the AVL tree. What will be tree after insertion of 70. (1)

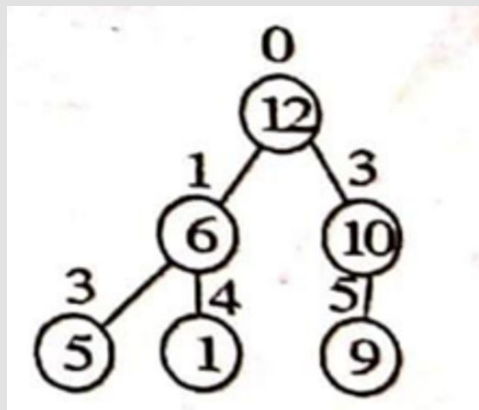


Q1(g)

- (h) Write selection sort algorithm. (1)
- (i) What do you mean by stack overflow? (1)
- (j) Write DFS technique steps. (1)

PART B

- Q2** (a) Write short note on BST. (3)
- (b) Consider the below tree and show all the heap sort steps on this. (2)



Q2(b)

- Q3** (a) What do you mean by Data Structure? Explain the types of data structure. (3)
- (b) What are the advantages of circular queue over traditional queue? (2)

Q4 Write a program to remove duplicates from linked list. (5)

Q5 (a) Explain Linear Search and binary search technique and compare complexity of both the techniques. (3)

(b) What is the objective of hashing? Also name some collision handling techniques. (2)

Q6 (a) Write the algorithm for stack push operation. (2)

(b) Explain the algorithm for infix to postfix expression and convert the following infix to postfix expression using stack: (3)

$$A + (B \times C - (D/E \wedge F) \times G) \times H$$



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