



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2022-23

CMSACOR05T-COMPUTER SCIENCE (CC5)

Time Allotted: 2 Hours

Full Marks: 40

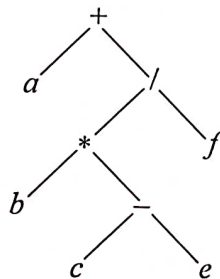
*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer Question No. 1 and any four from the rest

1. Answer any **four** from the following:

2×4 = 8

- (a) How many links must be changed to delete an item from a doubly link list?
- (b) What are the benefits of Priority Queue?
- (c) Differentiate between linear and non-linear data structure.
- (d) Lists the application of tree.
- (e) Evaluate the converse postfix expression of the following expression tree:



- (f) Will Binary search work if the sorted numbers are stored in a singly linked list? Justify.
- (g) Find the value of polish expression when $a=1, b=2, c=3, d=4, e=5$ and $f=6$.

$$g = abc*+df/e+-$$

- 2. (a) Draw all the possible binary trees that have four leaves and all the non-leaf nodes have no children.
- (b) Show what would be printed by each of the following:
 - (i) A depth first order traversal of the tree.
 - (ii) A symmetric order traversal of the tree.
- (c) Define height and depth of a binary tree.

4+2+2

3. (a) Define a binary search tree. Show the result of inserting 5, 3, 6, 8, 11, 4, 7, 9 into an initially empty binary search tree. Then show the result of deleting the root. Insertion and deletion should be shown in step by step manner. (2+4)+2
- (b) What is expression tree? Give example.
4. (a) Write Quick sort algorithm. Sort the following list of elements using quick sort: (2+4)+2
11 2 9 -25 35 -7 17 3
- (b) Write differences between recursion and iteration.
5. (a) What is the difference between hashing and indexing techniques? 2+2+4
- (b) What do you mean by collision resolution?
- (c) Given input {4371, 1423, 6273, 9149, 3494, 8679, 1989} and a hash function $h(x) = x \bmod 10$, show the result of the following:
- (i) open addressing hash table using linear probing.
- (ii) open addressing hash table using quadratic probing.
6. (a) What is queue? Consider a queue using singly linked list is formed in memory. Write an algorithm to insert an item into the queue. 4+4
- (b) Write an algorithm to sort two separate sorted lists (list A contains k elements and list B contains n elements) into a single sorted list, the resultant list C will contains $k+n$ elements in descending order.
7. (a) How the insertion sort is done with the array? 2+2+2+2
- (b) Is the heap sort always better than the quick sort? Give reasons for your answer.
- (c) Is the bubble sort a stable sorting algorithm? Give the proper reasons in support of your answer.
- (d) What is partition exchange sorting technique?