



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2021-22

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* questions from the rest

1. Answer any *four* questions from the following: 2×4 = 8
- (a) What is a “**Tri-diagonal Matrix**”? Give example.
 - (b) Mention two applications of queue.
 - (c) Define ADT.
 - (d) Define data structures.
 - (e) What is the maximum possible height of an AVL tree with 7 nodes?
 - (f) The in-order and pre-order traversals of a binary tree are DBE AFC and DEBFCA respectively. What will be the total number of nodes in the left-subtree of the given binary tree?
 - (g) What is meant by a stable sorting algorithm?
2. (a) Obtain the BST (Binary Search Tree) for the months of the year in the following order: 5
JAN, MAR, JUN, FEB, JUL, MAY, APR, SEP, AUG, OCT, NOV, DEC.
- (b) How many comparisons were needed to insert NOV? 1
- (c) Compute the average number of key comparisons required for the building of the above BST. 2
3. (a) Evaluate the following postfix expression using stack:— 6
 $2\ 3\ 4\ * + 8 -$
- (b) What is the advantage of using prefix or postfix notation in computers? 2
4. What is a priority queue? Which data structure is suitable for implementing a priority queue? Write an algorithm to extract an element from a priority queue. 2+2+4

5. Write the insertion sort algorithm. Sort the following list of elements using insertion sort and also calculate the number of comparisons required: 3+3+2
15 -31 23 -19 37 0 9 29
6. What is an AVL tree? Insert 6, 12, 7, 3, 5, 15, 10, 4 (in the given order) into an initially empty AVL tree. Then delete 15, 7, 6 and 4 from it. 2+4+2
7. What is a Sparse Matrix? Explain how a Sparse Matrix can be represented efficiently by a linked list. Provide an algorithm for extracting an element from a circular queue. 2+3+3

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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