



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2019

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.*

GROUP-A

1. Answer any **four** questions from the following: 2×4 = 8
- (a) What is saddle point of a matrix?
 - (b) Distinguish between linear and non-linear data structure.
 - (c) What is the advantage of storing elements in the form of a Binary Search Tree?
 - (d) What are the characteristics of a Good Hash Function?
 - (e) How does an AVL tree differ from a Binary Search Tree?
 - (f) Why Linked List is not suitable data structure for implementing Binary Search?
 - (g) What is the maximum and minimum height of a binary tree with n -nodes?
[Consider height of root is zero]

GROUP-B

Answer any **four** questions from the following

8×4 = 32

2. (a) What is the number of all possible distinct binary trees of 4 nodes? 4
(b) Prove that a tree with n nodes has exactly $n - 1$ edges. 4
3. (a) Reconstruct the original binary tree from the following sequences: 4
Inorder sequence: D, G, B, H, E, A, F, I, C
Preorder sequence: A, B, D, G, E, H, C, F, I
(b) Convert the following arithmetic expression from infix to postfix using stack: 4
 $(a + b^c d) * (e + f / d)$
4. (a) How will you represent the polynomial $4x^3 - 10x^2 + 3$ using linked list? 2
(b) Write an algorithm to reverse the direction of links of a given singly linked list. 4
(c) Write an algorithm to delete an element from the beginning of a doubly linked list. 2

5. (a) What is the advantage of using Circular Queue over Linear Queue? 2
 (b) Compare and contrast Recursion and Iteration. 4
 (c) What is the purpose of using Self-organizing list? 2
6. (a) Define a B-tree of order m . 2
 (b) What is a threaded binary tree? Give illustration. How can threads be used to simplify the traversal of a binary tree? 2+2+2
7. (a) Imagine a hash-table of size 10. Using the hash function $f(i) = i \% 10$, and open-addressing with linear probing for collision resolution, insert the following four keys one by one into the hash table: {2, 13, 22, 4}. Show the contents of the hash table after each insertion. 4
 (b) Prove that $n_0 = n_2 + 1$, where n_0 is the number of leaf vertices and n_2 is the number of vertices of degree 2 of a non-empty binary tree. 4
8. (a) Deduce the time Complexity of bubble sort in two cases (best case and worst case). 4
 (b) Calculate the number of comparisons and number of swapping required for the following sequence to sort in ascending order using insertion sort. 4
 80, 15, 37, 92, 12, 56, 44, 63

— x —