WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-II Examinations, 2017

COMPUTER SCIENCE-HONOURS

PAPER-CMSA-IV-A

Time Allotted: 2 Hours | Full Marks: 50

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

Answer Question Number 1 and any ***three*** questions from the rest taking at least ***one*** question from each Group

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) What is the maximum height of an AVL tree with *n* nodes?

   (b) How many links must be changed to insert a node in a doubly linked list?

   (c) Why is straight selection sort more efficient than that of the Bubble sort?

   (d) What is expression tree?

   (e) What is bootstrap loader?

   (f) What is the role of dispatcher?

   (g) What is distributed operating system?

   (h) What is thrashing?

   (i) What is starvation?

Group-A

2. (a) Show that the number of null links of a given binary tree with n nodes is $n + 1$. 4

   (b) Write a non-recursive algorithm to traverse a binary tree in Inorder technique. Illustrate it with an example. 6

   (c) Construct a binary tree whose Inorder and Preorder traversals are given below: 3+1

Inorder:	B	C	E	D	F	A	G	H
Preorder:	A	B	C	D	E	F	G	H

   Is it possible to construct a unique binary tree from its Preorder and Postorder traversals?

3. (a) What do you mean by a heap? How can a heap be represented using an array? 2+2

   (b) Given a binary tree whose left and right sub trees are heaps, write an algorithm to convert it into a heap. 6

   (c) Using the algorithm developed for (b) to obtain an algorithm that convert an array of arbitrary elements into a heap. 4

4. (a) What do you mean by Collision Resolution? What are the different major Collision Resolution Techniques? 1+1

   (b) Write a function for insertion and searching of an element in a hashed table where collisions are resolved by Separate Chaining. 5

   (c) Define a binary search tree. Write an algorithm for searching a given element in a binary search tree. If the element is not present, your algorithm should insert it in the tree so that it remains a binary search tree. What is the minimum height of a binary search tree with n nodes? 2+4+1

Group-B

5. (a) Explain the difference between multilevel queue scheduling and multilevel feedback queue scheduling. 4

   (b) How does the performance of R.R. (Round-Robin) scheduling algorithm depend on the time quantum? – Explain. 4

(c) Assume that the 5 processes arrive at time 0, in the order given below with the length of the CPU burst time given in milliseconds: 3+3

The following processes are assumed to have arrived in the given order all at time 0.

Process	Arrival Time	Burst Time
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Draw 3 Gantt charts for the execution of these processes using SJF, FCFS and non-preemptive priority scheduling. Calculate the turn-around time of these scheduling algorithms.

6. (a) What is the "Mutual Exclusion" requirement with reference to critical section? 2

(b) What are the differences between deadlock prevention and deadlock detection approaches for handling deadlock? 3

(c) Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212K, 417K, 112K and 426K (in order)? Which algorithm makes the most efficient use of memory? 6

(d) How working set model can be used to handle thrashing? 3

7. (a) Explain the utilities of memory swapping. 3

(b) How does a time sharing system work? 2

(c) State the significances of a clock in the I/O interrupts handling. 3

(d) Why different security measurements are required in a file server? 2

(e) Write down a formula to calculate the effective access time to judge the performance of demand paging. 4