WEST BENGAL STATE UNIVERSITY

B.Sc. Honours Part-II Examination, 2022

COMPUTER SCIENCE

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.
All symbols are of usual significance.

Answer Question No. 1 and any *three* from the rest taking at least *one* from each group

1. Answer any ***four*** questions from the following: 2×4 = 8
   (a) What is the advantage of storing elements in the form of a binary search tree?
   (b) 'Use of stack is necessary for postfix evaluation' — Justify the statement.
   (c) Define heap. Give example.
   (d) What do you mean by bounded-waiting?
   (e) Differentiate between logical address and physical address.
   (f) What is the difference between multiprocessing and multiprogramming?
   (g) What do you mean by seek time of a disk?
   (h) What do you mean by external fragmentation?

GROUP-A

2. (a) Show how a polynomial can be represented using an array and using a linked list. 4
   (b) Compare and contrast between single linked list and doubly linked list. 3
   (c) Write an algorithm to delete a node from a doubly linked list. How many pointers movement are required to implement the above algorithm? 4+1
   (d) What is binary search tree? 2

3. (a) Write an algorithm to perform Quick sort. 5
   (b) Establish the best case, worst case and the average case complexity of quick sort method. 2+2+5

4. (a) Write an algorithm to delete an element from a binary search tree. The node may have no child, one child or two children. 5

(b) The inorder and preorder sequence is given below. Draw the binary search tree. 4

Inorder: E A C K F H D B G

Preorder: F A E K C D H G B

(c) Explain collision resolution scheme using linear probing with open addressing using example. 5

GROUP-B

5. (a) Differentiate between long-term and short-term scheduler. Why are they called so? 4

(b) Define waiting time, turnaround time and response time with example. 3

(c) Consider four holes of size 350 KB, 200 KB, 270 KB and 180 KB in the order. Three processes P1, P2, P3 of sizes 210 KB, 175 KB and 170 KB are arriving in the memory for allocation in the respective order. Following the best-fit strategy, find the allocation. Also calculate amount of internal and external fragmentation. 4

(d) When starvation does occur? Write a solution for it. 2+1

6. (a) What is process? 3

(b) Suppose that the following process arrive for execution at the times indicated in the following table. Each process will run for the amount of time listed in Table 1. Use nonpreemptive scheduling in answering the following questions: 3+3

Process	Arrival time	Burst time
P_1	0.0	8
P_2	0.4	4
P_3	1.0	1

Table: 1

What is the average turnaround time for these processes with FCFS and SJF scheduling algorithm?

(c) What is semaphore? Briefly explain the role of semaphore for critical section problem. 2+3

7. (a) Consider the following page reference string: 4

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

Calculate the number of page faults in Optimal and FIFO page replacement algorithm. Assume available free frames as three.

(b) What is Belady's anomaly? Give example. 4

(c) Consider SSTF disk scheduling algorithm and draw the graph for the following request queue: 3

45, 32, 92, 43, 22, 67, 32, 78, 83, 55, 82.

Consider the initial disk head position at 30.

(d) What is hit ratio? If cache-min occurs 7 times out of 10, then what is the value of hit ratio? 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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