

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2019

FIRST YEAR [BATCH 2018-21]

COMPUTER SCIENCE (General)

Date : 29/05/2019

Time : 11 am – 1 pm

Paper : II

Full Marks : 50

[Use a separate Answer Book for each group]

Group - A

Answer any one question from Question Nos. 1 & 2 :

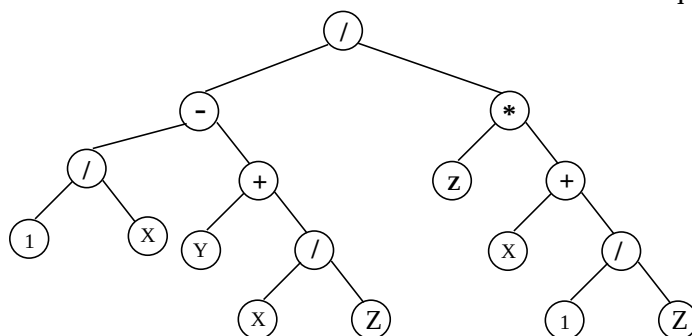
[1×5]

1. Write an algorithm that takes two arrays, and returns true if the arrays are disjoint; i.e. have no elements in common. [5]
2. Write an algorithm to insert a new element in an array which is sorted in the ascending order. After inserting the new element, the array should be sorted as well. [5]

Answer any two questions from Question Nos. 3 to 6 :

[2×10]

3. a) Write down the In-order and Post-order traversal sequences of the following binary tree:- [2+2]



- b) Define a binary tree. [2]
- c) Write an algorithm to search an element in a binary tree. The algorithm should consider the case for unsuccessful search as well. [4]
4. a) Compare and contrast 'sequential' and 'linked' representation of binary tree. [3]
- b) Write down recursive algorithm of binary search. [4]
- c) Define Big-Oh notation in context with the complexity of an algorithm. [3]
5. a) Give postfix expression of the following using stack. [4]
$$A + (B * C - (D / E ^ F) * G) * H$$
- b) Is there any advantage of using an iterative function over the corresponding recursive one. Justify with proper examples. [3]
- c) Write down the algorithm of DFS operation in a graph. [3]
6. a) Write an algorithm to merge two sorted singly linked lists. [6]
- b) Write an algorithm to implement the deletion operation of a linear queue using a singly linked list. [4]

Group - B

Answer any one question from Question Nos. 7 & 8 :

[1×5]

7. What is a multiprocessing operating system? Explain the importance of the critical section of a process in this connection. [2+3]

8. Differentiate between a CPU bound process and an I/O bound process with examples. What is a ready queue? [3+2]

Answer any two questions from Question Nos. 9 to 12 : [2×10]

9. a) Illustrate the differences between preemptive scheduling algorithm and non-preemptive scheduling algorithms in process management. [3]
 b) What is an orphan process? [2]
 c) A system that uses Banker's algorithm, has five processes and uses four different types of resources (A,B,C,D).

Total Resources				
A	B	C	D	
13	13	9	13	

Process	Allocation				Need			
	A	B	C	D	A	B	C	D
P1	1	0	2	0	3	2	4	2
P2	0	3	1	2	3	5	1	2
P3	2	4	5	1	2	7	7	5
P4	3	0	0	6	5	5	0	8
P5	4	2	1	3	6	2	1	4

Is the system in safe state? [5]

10. a) What is a binary semaphore? [2]
 b) Give a solution to the producer consumer problem using semaphore. [6]
 c) What is a priority queue? [2]
11. a) Consider the following set of processes that need to be scheduled on a single CPU. All the times are given in milliseconds.

Process Name	Arrival Time	CPU Execution Time
A	0	6
B	3	2
C	5	4
D	7	6
E	10	3

Calculate average waiting time for these processes using SRTF algorithm. [5]

- b) What are the strengths of the paging scheme in memory management? Is internal fragmentation possible in this scheme? Justify. [3+2]
12. a) What is a PCB ? Explain its different components. [1+3]
 b) Consider the following reference string : 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults will occur for optimal page replacement algorithm using four page frames? [4]
 c) State the difference between deadlock prevention strategy and deadlock avoidance strategy. [2]

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