RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2017

FIRST YEAR [BATCH 2016-19]

Date : 26/05/2017 **COMPUTER SCIENCE (General)**

Time : 11 am – 1 pm **Paper :** II Full Marks : 50

[Use a separate Answer Book for <u>each group</u>]

Group - A

1. Answer **<u>any one</u>** question : [1×5]

   a) Explain the merits and demerits of using a linked list over an array. [2·5+2·5]

   b) What is strictly binary tree? Find the total number of nodes in a strictly binary tree if the number of leaf nodes is 'n'. [2+3]

Answer <u>any two</u> questions from <u>Question Nos. 2 to 5</u> : [2×10]

2. a) In respect of complexity, compare among insertion and selection sort algorithms. [5]
   b) Convert AB – C + DEF – + $ to its infix expression using stack. [5]

3. a) Construct a BST (Binary Search Tree) using following elements. 5, 1, 8, 57, 39, 33, 90, 71, 5, 97. [4]
   b) Briefly discuss about Big-Oh and Big-Omega notations in the context of asymptotic time complexity analysis. [6]

4. a) Write C functions to implement the following :
      i) Insert an element in a linear queue using a singly linked list. [3]
      ii) Delete the last node from a circular linked list. [3]
   b) Construct a binary tree using the in-order and post-order traversals as given below :
      In order : B C A E D F
      Post order : C B E F D A [4]

5. a) Write down the C function to implement insertion sort on an array containing 'n' elements. [5]
   b) Implement push and pop operations on a stack using a singly linked list. Perform the above operations in 0(1) time. [5]

Group - B

6. Answer **<u>any one</u>** question : [1×5]

   a) i) What are the necessary conditions for deadlock? [2]
      ii) Discuss the role of a semaphore in solving the critical section problem. [3]
   b) i) Explain the term 'Page fault'. [2]
      ii) What is virtual memory and what are its advantages? [1·5+1·5]

Answer <u>any two</u> questions from <u>Question Nos. 7 to 10</u> : [2×10]

7. a) Explain the differences between paging and segmentation in context with memory management. [4]
   b) Make a comparative study between preemptive and non-preemptive process scheduling algorithms. [3]
   c) Discuss process life cycle with a suitable diagram. [3]

8. a) Consider a system with five processes P0, P1, P2, P3 and P4 and four resource types A, B, C and D. Suppose that we have the following snapshot of resource allocation state of the system : [5]

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Check if the system is in safe state using Banker's algorithm.

b) With proper example, distinguish between logical and physical address space. [3]

c) What is Belady's anomaly? [2]

9. a) What is a race condition? What are all the conditions that should hold good for its solution? [4]

b) Write short notes on : [3+3]

i) Priority scheduling

ii) Inter-process communication

10. a) Discuss different file access methods. [6]

b) Explain absolute and relative path name with suitable examples. [2+2]

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