RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY-JUNE 2013

FIRST YEAR

Date : 22/05/2013 — **Computer Science (General)**

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

(Use separate answer books for each group)

Group – A

Answer **any one** question from the followings: [5x1]

1. Describe the situation of the Queue after the following sequence of operations and clearly mark the front and rear end. [5]
   Insert (5), Insert (8), Insert (1), Insert (12), Delete ( ), Delete ( ), Insert (14), Delete ( ), Insert (7), Insert (13)

2. a) Write down any three properties of an algorithm [3 + 2]
   b) What do you mean by time complexity of an algorithm?

Answer **any two** questions from the followings: [10×2]

3. a) Define Big-Theta notation for analysing an algorithm. [3]
   b) Prove that $7n + 15 = O(n)$ [3]
   c) Show that Big Oh notation is transitive [4]

4. a) Write the algorithm to convert a given Infix expression to its equivalent postfix expression. [6]
   b) Convert the given Infix expression into its equivalent postfix expression. [4]
   $(a * (b+c) - (d+e+f))$

5. a) Why is it required to use a queue in implementing BFS algorithm? [3]
   b) Show the steps to place the first element of the following list in its proper position after the list gets sorted using quick sort technique. [5]
   7 3 9 4 -3 0 8 1 -4
   c) Write down the worst case and the average case time complexities of the above algorithm. [2]

6. a) Write an algorithm for doing a Depth First Search on a given graph and discuss the running time of the algorithm. [7]
   b) Discuss the "inch-worm" effect of Queue data structure. [3]

Group – B

Answer **any one** question from the followings: [5x1]

7. Describe internal and external fragmentation. [5]

8. a) Explain the advantages of using a virtual memory. [3]
   b) How does protection of data is enforced in a multiprogramming operating system? [2]

Answer **any two** questions from the followings: [10×2]

9. a) What is the role of system calls in operating system? [3]
   b) Explain different types of kernels with proper example. [4]
   c) What is context switching? [3]

10. a) What is Belady's anomaly in FIFO page replacement technique? [2]
    b) Consider the following page reference string and a frame of size 4: [5]
    2 3 2 1 5 4 3 1 6 5 3 6 2 4 1 5
    Using LRU technique, find the number of page faults.
    c) Differentiate prepaging technique and demand paging technique. [3]

11. a) Consider the following table: [6]

Process	Arrival Time	Burst Time
P_1	1	8
P_2	3	3
P_3	4	5
P_4	6	6

    Using Shortest Remaining Time First algorithm, find out the average turnaround time of all the processes.
    b) Explain the different criteria to occur a deadlock of processes. [4]

12. a) What is critical section problem? [3]
    b) Explain Resource Allocation Graph. [3]
    c) State differences between physical and logical address. [4]