RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [BATCH 2018-21]
B.A./B.Sc. SECOND SEMESTER (January – June) 2019
Mid-Semester Examination, March 2019

Date : 26/03/2019

COMPUTER SCIENCE (General)

Time : 11 am – 12 noon   Paper : II   Full Marks : 25

[Use a separate Answer Book **for each group**]

Group – A

Answer **any one** question :   [1×2·5]

1. a) Let A be a two-dimensional array declared as follows:

$$A : array\ [1.....10][1.....15]\ of\ integer,$$

Assume that each integer takes one memory locations. The array is stored in row-major order and the first element of the array is stored at location 100, what is the address of the element $A[i][j]$?   [1.5]

   b) The following sequence of operations is performed on stack:

PUSH (10), PUSH (20), POP, PUSH (10), PUSH (20), POP, POP, POP, PUSH (20), POP. What is the sequence of the popped out values?   [1]

2. a) What is the postfix expression for the following infix expression?   [2]

$$A+B*(C+D)/F+D*E$$

   b) Define Linked-List.   [.5]

Answer **any two** questions :   [2×5]

3. a) Write an algorithm to reverse a Singly Linked-List.   [3]
   b) What are the advantages of circular queue over linear queue.   [2]

4. a) Write an algorithm to delete the last node of a Singly Linked-List.   [3]
   b) Write an algorithm of the PUSH operation onto a stack.   [2]

5. a) Define data structure.   [1]
   b) Write an algorithm of Binary Search operation.   [4]

Group – B

Answer **any one** question :   [1×2.5]

6. Explain the differences between message passing and shared memory as inter process communication techniques .   [2.5]

7. Explain race condition with example.   [2.5]

Answer **any two** questions :   [2×5]

8. Explain how producer-consumer problem can be solved using semaphore.   [5]

9. a) 'Deadlock is a probabilistic event'— Justify.   [2]

b) Differentiate between deadlock avoidance and deadlock prevention. [3]

10. An operating system uses pre-emptive SJF scheduling algorithm. Consider the following arrival times and CPU execution times for the following process.

Process	Arrival Time (ms)	CPU Execution Time (ms)
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Show Gantt chart and calculate total waiting time for process P_1. [5]

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