Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/BSC(H) Biotechnology/Genetics/Microbilogy/

MOL. BIO/SEM-3/CA-301/2012-13

2012

INTRODUCTION TO DATA STRUCTURE AND COMPUTER ORGANIZATION

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) A data structure in which an element is added and removed only from one end is known as :
      a) Queue b) Stack
      c) Array d) None of these.

   ii) One can convert an infix expression to a postfix expression using a
      a) Stack b) Queue
      c) Dequeue d) None of these.

   iii) Which one of the following operations is not performed by ALU ?
      a) Clear
      b) Logical OR
      c) Logical AND
      d) Floating point calculation

iv) In which addressing mode, the effective address of the operand is generated by adding a constant value to the contents of a register

a) Indirect mode b) Index mode

c) Absolute mode d) Direct mode.

v) This searching method requires that all keys must reside in internal memory

a) Binary search b) Sequential search

c) Hashing d) None of these.

vi) In this sort, file is divided into subfiles which are to be independently sorted and then merged.

a) Quick sort b) Selection sort

c) Bubble sort d) None of these.

vii) What is not true for adjacency matrix of a graph

a) It is a symmetric matrix

b) It is a bit matrix

c) Diagonal has all zeroes

d) All are true statements.

viii) The contents of information are stored in

a) Memory access register

b) memory arithmetic register

c) Memory data register

d) Memory address register.

ix) The idea of cache memory is based on

a) The heuristic 90-10 rule

b) The property of locality of reference

c) The fact that only a small portion of a program is referenced relatively frequently

d) All of these.

x) Which of the following I/O mechanisms requires the least hardware support ?

a) Polled b) Interrupt driven

c) DMA d) Memory-mapped.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Write the advantages of Linked List over array.
3. Write an algorithm or function for Selection sort.
4. Represent the following polynomial using singly linked list :

   $5x^3 + 2x^2 + 10x + 6$
5. Define walk, path, Cycle of a graph with proper diagram.
6. Show the details of registers which are used in DMA controller.
7. Describe the I/O mapping methods.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) How the polynomial $3x - 11x^2 + 9$ can be represented using a linked list.

   b) Consider the following arithmetic infix expression Q :

   A + (B * C – (D / E ↑ F) * G) * H

   Evaluate the resulting Postfix expression

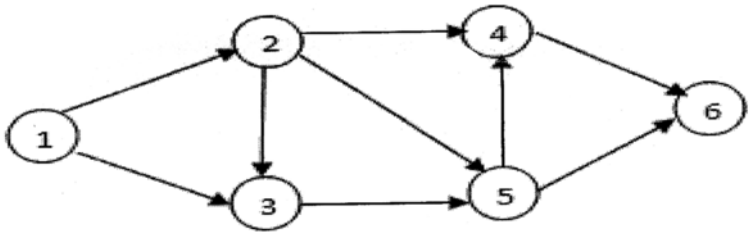
   c) Compare recursion and iteration

   d) What is the limitation of linear queue and how it can be solved ?

   e) State one real life example of stack (3 + 6 + 3 + 2 + 1)

9. a) Write with example the concept of Tail recursion.
   b) Write an algorithm of selection sort
   c) Sort the following unmbers using Bubble sort technique.
      33, 86, 57, 92, 37, 48, 25, 12
   d) What is Cycle and Hamiltonial Cycle 2 + 5 + 5 + (2 + 1)

10. a) find the degree of each of the vertex of the following graph



   b) What is the difference between RAM and ROM
   c) Write an algorithm or function for insertion and deletion operation of queue.
   d) What are the differences between BFS and DFS ?
      3 + 3 + (3 + 3) + 3

11. a) What is the difference between memory mapped I/O and I/O mapped I/O ?
   b) Explain Bitwise operation in ALU with example
   c) How does cache memory work ? Discuss with basic diagram.

12. Write short note for any 3 of the following : 3 × 5 = 15
   a) Towers of Hanoi problem and solution
   b) Array row/column major ordering
   c) DMA
   d) Abstract data type
   e) Push And Pop operation in Stack.