



UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY

Academic Year 2011/2012 – 2<sup>nd</sup> Year Examination – Semester 4

***IT4104: Programming II***  
***Part 1: Multiple Choice Question Paper***

21<sup>st</sup> July, 2012  
(ONE HOUR)

**Important Instructions :**

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- The paper has **25 questions** and **6 pages**.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with **one or more** correct answers.
- All questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from 0 (*All the incorrect choices are marked & no correct choices are marked*) to +1 (*All the correct choices are marked & no incorrect choices are marked*).
- Answers should be marked on the special answer sheet provided.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**

1) Consider the following description which explains a particular approach for a hash function.

“A key is divided into several parts, these parts are combined together and transformed in a certain way to create the target address.”

Above description describes which of the following hashing function.

- |                |                          |                  |
|----------------|--------------------------|------------------|
| (a) Division   | (b) Folding              | (c) Mid – square |
| (d) Extraction | (e) Radix transformation |                  |

2) Label setting mechanism is used to

- |  |
|--|
| (a) check cycles in a graph.                   |
| (b) determine the maximum flow of a graph.     |
| (c) find the level of a node of a binary tree. |
| (d) find the shortest path in a graph.         |
| (e) delete a node from a linked list.          |

3) Expected, operational time in a priority queue is

- |              |                  |              |
|--------------|------------------|--------------|
| (a) $O(n)$ . | (b) $O(\lg n)$ . | (c) $O(2)$ . |
| (d) $O(1)$ . | (e) $O(3)$ .     |              |

4) In a sequence of processes, process P2 may need to be executed before process P1, for proper functioning of the system, though P1 lined on the queue before P2. This type of a modified queue is called

- |                      |            |                     |
|----------------------|------------|---------------------|
| (a) Priority queue.  | (b) Heap.  | (c) Circular queue. |
| (d) Circular buffer. | (e) Stack. |                     |

5) Select from among the following, correct statement(s) on skip list.

- |   |
|---|
| (a) Searching of an element of a skip list is comparatively very efficient.           |
| (b) Skip list strictly requires sequential scanning to locate a searched-for element. |
| (c) Insertion or deletion procedure of a skip list is comparatively very inefficient. |
| (d) In an ideal situation the search time of a skip list is $O(n)$ .                  |
| (e) Synonyms for skip list are AVL and splaying.                                      |

6) Consider the following scenario on Graphs data structure.

“To determine if two vertices are in the same set one needs find the set to which a vertex belongs and uniting two sets into one if candidate vertices represents two different sets”

Select from among the following, the correct option(s) which describe the above scenario.

- |                                       |                               |                   |
|---------------------------------------|-------------------------------|-------------------|
| (a) Depth First search                | (b) <b>Union find problem</b> | (c) Spanning tree |
| (d) Connectivity in undirected graphs | (e) Breadth first search      |                   |

7) Consider the following Java implementation for a class.

```
public class WhatClass{
    public Object info;
    public WhatClass next;
    public WhatClass(){
        next = null;
    }
    public WhatClass(Object el){
        info = el;        next = null;
    }
    public WhatClass(Object el,WhatClass ptr){
        info = el;        next = ptr;
    }
}
```

Above implementation describes a

- |                             |               |                |
|-----------------------------|---------------|----------------|
| (a) Singly Linked List Node | (b) Tree Node | (c) Graph Node |
| (d) Doubly Linked List Node | (e) Queue     |                |

8) Consider the following Java implementation of a class.

```
public class WhatClass{
    public int info;
    public WhatClass next, prev;
    public WhatClass(int el){
        this(el,null,null);
    }
    public WhatClass(int el, WhatClass n, WhatClass p){
        info = el; next = n; prev = p;
    }
}
```

Above implementation describes a

- |                             |               |                |
|-----------------------------|---------------|----------------|
| (a) Singly Linked List Node | (b) Tree Node | (c) Graph Node |
| (d) Doubly Linked List Node | (e) Queue     |                |

9) Consider the following programming statements written in Java representing a part of a program.

```
public void addToTail(int el){
    if (isEmpty()) {
        tail = new IntSinglyLinkedList(el);
        tail.next = tail;
    }
    else {
        tail.next = new IntSinglyLinkedList(el, tail, next);
        tail = tail.next;
    }
}
```

The segment of the program shows how to inset a node to a tail of a SinglyLinkedList. Select from among the following the correct option, which shows the kind of Linked List which allows such an operation.

- |                        |                          |               |
|------------------------|--------------------------|---------------|
| (a) Singly Linked List | (b) Circular List        | (c) Skip List |
| (d) Double Linked List | (e) Self Organizing List |               |

10) A digraph may not always be strongly connected, but it may be composed of Strongly Connected Components (SCC). Select from among the following, the approach which can be referred to determine SCC.

- |                          |                         |                    |
|--------------------------|-------------------------|--------------------|
| (a) Breadth first search | (b) Deletion by merging | (c) Post traversal |
| (d) Depth first search   | (e) Deletion by copying |                    |

11) Select from among the following the situation(s) where the topological sort **cannot** be applied to a diagram.

- |   |
|---|
| (a) When cycles are included.                     |
| (b) When a network is formed.                     |
| (c) When a maximum flow has exceeded.             |
| (d) When minimum limit of expenses are increased. |
| (e) When an inserted label found to be augmented. |

12) Which of the following network of graph theorem/algorithm introduced by Ford and Fulkerson?

- |                             |                                |                    |
|-----------------------------|--------------------------------|--------------------|
| (a) Trajan's algorithm      | (b) Max-flow-min-cut theorem   | (c) Morris theorem |
| (d) Binary search algorithm | (e) Nondeterministic algorithm |                    |

13) There are different ways to organize self organizing lists. In the table given below column I contains the methods which can be used to organize self organizing lists. Column II lists a simple description to each method in the column I. But those descriptions are not ordered according to the column I.

Column I	Column II
A. Move-to-front	I. Order the list using certain criteria natural for the information under scrutiny
B. Transpose	II. Order the list by the number of times elements are being accessed.
C. Count	III. After the desired element is located, swap with its predecessor unless it is at the head of the list.
D. Ordering	IV. After the desired element is located, put it at the beginning of the list

Match each method from column I with the most appropriate description in column II.

- |  |
|--|
| (a) A. → IV.    B. → III.    C. → II.    D. → I. |
| (b) A. → II.    B. → III.    C. → I.    D. → IV. |
| (c) A. → III.    B. → I.    C. → IV.    D. → II. |
| (d) A. → II.    B. → IV.    C. → III.    D. → I. |
| (e) A. → III.    B. → IV.    C. → II.    D. → I. |

14) Which of the following can be considered as application of stack data structure?

- |   |
|---|
| (a) Serving request of a single shared resource.            |
| (b) Transferring data asynchronously between two processes. |
| (c) Interrupt handling.                                     |
| (d) Arithmetic expressions evaluation.                      |
| (e) Converting from infix to postfix expressions.           |

15) Which of the following can be considered as application of queue data structure?

- |   |
|---|
| (a) Serving request of a single shared resource.            |
| (b) Transferring data asynchronously between two processes. |
| (c) Interrupt handling.                                     |
| (d) Arithmetic expressions evaluation.                      |
| (e) Converting from infix to postfix expressions.           |

16) Consider the following infix expression.

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

Select from among the following, the correct post fix expression corresponds to the above infix expression.

- |                             |                             |
|-----------------------------|-----------------------------|
| (a) $A + B * C - D / E + F$ | (b) $A + B * C D E + F - /$ |
| (c) $A B C D E F + / - * +$ | (d) $F * E + + D C B / -$   |
| (e) $F E D C B + + / * -$   |                             |

17) In a Graph when the minimum number of vertices are connected it is called a spanning tree. Which of the following method(s) would create a spanning tree as a by product?

- |                          |                                      |
|--------------------------|--------------------------------------|
| (a) Depth first search   | (b) Union find problem               |
| (c) Cycle detection      | (d) Connectivity to undirected graph |
| (e) Breadth first search |                                      |

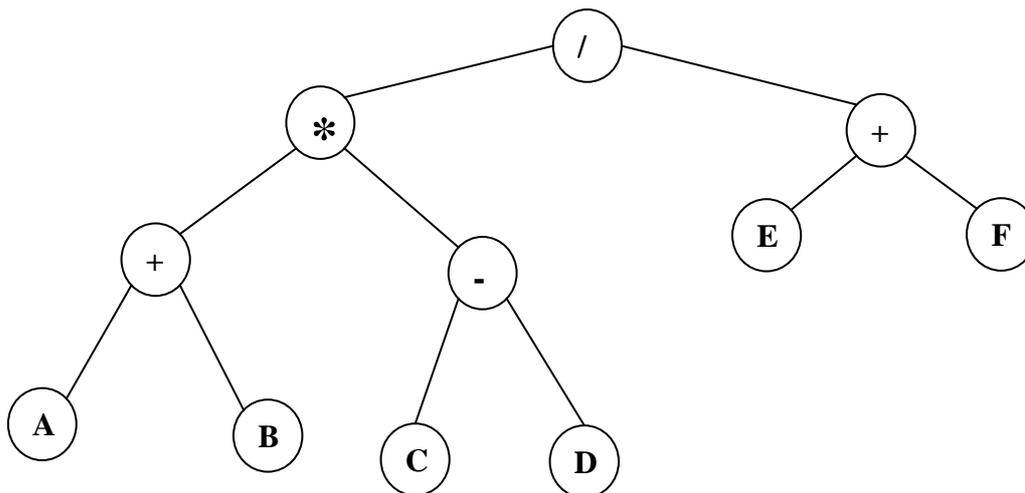
18) When an item is inserted to a queue, the front should move towards front side and when removing an item also the other items should move. But this is not an efficient, instead, while items are in the same place, rear and front locations are moved. This process is called

- |               |                 |
|---------------|-----------------|
| (a) Sorting   | (b) Wrap around |
| (c) Searching | (d) Dequeue     |
| (e) Enqueue   |                 |

19) Which of the following operations could cause a stack flow error?

- |             |               |            |
|-------------|---------------|------------|
| (a) clear() | (b) isEmpty() | (c) push() |
| (d) pop()   | (e) topEl()   |            |

Consider the following diagram to answer questions 20 – 24. It illustrates a data structure widely used in computing.



20) Select from among the following, a suitable name which can be given for the diagram.

- |                    |                        |            |
|--------------------|------------------------|------------|
| (a) AVL tree       | (b) Binary search tree | (c) B-tree |
| (d) Directed graph | (e) Linked list        |            |

21) After traversing through the diagram, one has come up with the following result set.

$$/ * + A B - C D + D F$$

The valid traversal mechanism that has been used is?

- |                |               |           |
|----------------|---------------|-----------|
| (a) Pre order  | (b) Selection | (c) Radix |
| (d) Post order | (e) In order  |           |

22) Again one has traversed through the diagram in a different way and has come up with the following result set.

$$A + B * C - D / E + F$$

The valid traversal mechanism that has been used is?

- |                |               |           |
|----------------|---------------|-----------|
| (a) Pre order  | (b) Selection | (c) Radix |
| (d) Post order | (e) In order  |           |

23) Once again one has traversed through the diagram in a different way and has come up with the following result set.

$$A B + C D - * E F + /$$

The valid traversal mechanism that has been used is?

- |                |               |           |
|----------------|---------------|-----------|
| (a) Pre order  | (b) Selection | (c) Radix |
| (d) Post order | (e) In order  |           |

24) In performing some of the traversals which comes under questions 21 – 23, following type of tasks are required to be performed.

- V - visiting a node
- L - traversing the left sub tree
- R - traversing the right sub tree

Which of the following, traversal method is used, if the traversing order is marked as VLR?

- |                |               |           |
|----------------|---------------|-----------|
| (a) Pre order  | (b) Selection | (c) Radix |
| (d) Post order | (e) In order  |           |

25) In broader sense one can categorized the traversal methods which come as the answers in the question 21 – 23 with a single name. Select from among the following the most suitable name which can be given.

- |                                     |                          |                   |
|-------------------------------------|--------------------------|-------------------|
| (a) Depth First search              | (b) Union find problem   | (c) Spanning tree |
| (d) Stackless depth first traversal | (e) Breadth first search |                   |

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