F.Y.B.Sc Comp. Sci. Sem II April 2018

Data Structures

Q. P. Code: 33070

(2½ Hours) [Total Marks: 75]

N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All(Each of 5Marks) **(15M)**

(a) Multiple Choice Questions

1)..... level is where the model becomes compatible executable code

A – Abstract level

B – Implementation level

C - Application level

D – All of the above

2) Which one of the below is not divide and conquer approach?

A - Insertion Sort

B - Merge Sort

C - Shell Sort

D - Heap Sort

3)Which of the following is true about the characteristics of abstract data types?
i) it exports a type
ii) It exports a set of operations

A- True, False
B- False, True
C- True, True
D- False, False

4) To represent hierarchical relationship between elements, Which data structure is suitable?

A- Dequeue
B- Priority
C- Tree
D- Graph

5) What is the worst case time complexity of linear search algorithm?

A - O(1)

B - O(n)

C - O(log n)

D - $O(n^2)$

(b) Fill in the blanks
(greater than , FIFO, end, postorder, a precondition)

1) The assertion given in the beginning segment in an algorithm is called _____.

2) In _____ traversal, the root node is visited last.

3) New nodes are added at the _____ of the list.

4) A queue, in other words, is called a _____ list.

5) The lower limit is modified when the key is _____ the middle element in the array in a binary search method.

(c) Short Answers

1) Define data structure.
2) Define priority queue.
3) Define hash function.
4) Define 2D array.
5) Define tree.

Q. 2 **Attempt the following (Any THREE)(Each of 5Marks)** **(15M)**

(a) Write short note on Map ADT.

(b) What is python set? List and explain any five functions of set.

(c) If **X** is an algorithm and n is the size of input data, then explain the factors which decide the efficiency of **X**.

(d) Write a short note on Big O notation.

(e) Define ADT. Explain Bags ADT.

(f) Sort the given set of numbers using insertion sorting:
12, 50, 20, 15, 10, 30, 45
Show step by step process.

Q. 3 **Attempt the following (Any THREE) (Each of 5Marks)** **(15M)**

(a) Define linked list. How linked list is implemented.

(b) Write a python code to implement queue operations using python list.

(c) Write algorithm to convert postfix into infix.

(d) Convert following infix expression to postfix:
i) A+(B*C-(D/E-F)*G)*H-B ii) A * (B + C * D) + E

(e) What is difference between queue and priority queue. Explain with example.

(f) Write short note on circular linked list traversal.

Q. 4 Attempt the following (Any THREE) (Each of 5Marks) **(15)**

(a) What is recursive function? List and explain the properties of recursion.

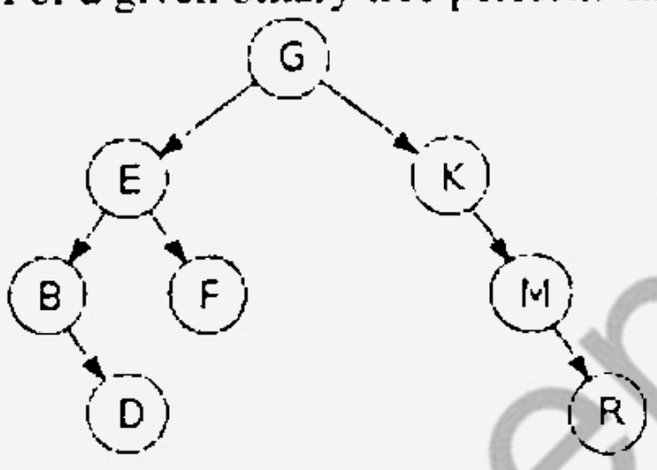
(b) What is rehashing? Explain with example.

(c) Why collision occurs in Hash table? Explain any one of the method to solve it.

(d) Sort the given set of numbers using merge sorting technique:
12, 1, 5, 88, 79, 75, 42, 31

(e) Define search tree. Explain B-search tree with example.

(f) For a given binary tree perform inorder, preorder,and postorder traversal:



Q. 5 Attempt the following (Any THREE) (Each of 5Marks) **(15)**

(a) What is difference between time and space complexity.

(b) What is List? Explain usage of list.

(c) What is expression tree? Represent expression 3 + ((5+9)*2) using expression tree.

(d) Convert abc-+de-fg-h+/* postfix to infix.

(e) Write short note on heaps and heapsort.