**[4757]-1086**

## S.E. (I.T.) (Second Semester) EXAMINATION, 2015

## DATA STRUCTURES AND FILES

### (2012 PATTERN)

**Time : Two Hours　　　　　　Maximum Marks : 50**

**N.B.** :— (*i*)　Answer *four* questions.

(*ii*)　Neat diagrams must be drawn wherever necessary.

(*iii*)　Figures to the right indicate full marks.

(*iv*)　Assume suitable data, if necessary.

1.　(*a*)　Change the following infix to postfix using stack. Clearly indicate the content of stack :　　　　[6]

(*i*)　(A + B) * C – D * F + C.

(*ii*)　(A – 2) * (B + C – D * E) * F.

(*b*)　Explain the implementation of circular queue using sequential organization.　　　　[6]

*Or*

2. (*a*) Implement Stack as an ADT using linked Organization. [6]

(*b*) Specify which of the following application would be suitable for a first-in-first-out queue and justify your answer : [4]

(*i*) A program is to keep track of patients as they check into a clinic, assigning them to doctors on a first come, first served basis.

(*ii*) An inventory of parts is to be processed by part number.

(*iii*) A dictionary of words used by spelling checker is to be created.

(*iv*) Customers are to take numbers at a bakery and be served in order when their number come-up.

(*c*) Define Multiqueues. [2]

3. (*a*) Write a function for creating Binary Search Tree. [4]

(*b*)   Define a graph. For the given adjacency matrix draw the graph
and  its  adjacency  list :                                    [8]

|   | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| A | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| B | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| C | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| E | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| F | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| G | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| H | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |

Find  all  the  nodes  adjacent  to  node  A,  node  F  and  node  G.

*Or*

**4.**   (*a*)   Construct  a  binary  tree  from  the  given  traversals :      [4]

Pre-order  :  $* + a - b \ c \,/- \ d \ e \ - \ + \ f \ g \ h$

In-order  :    $a \ + \ b \ - \ c \ * \ d \ - \ e \,/f \ + \ g \ - \ h$

(b) With example define the following terms wrt graphs : [4]

(i) Degree of node

(ii) Isolated node

(iii) Path

(iv) Cycle.

(c) For the given graph show stepwise representation of MST using Kruskal's algorithm. [4]
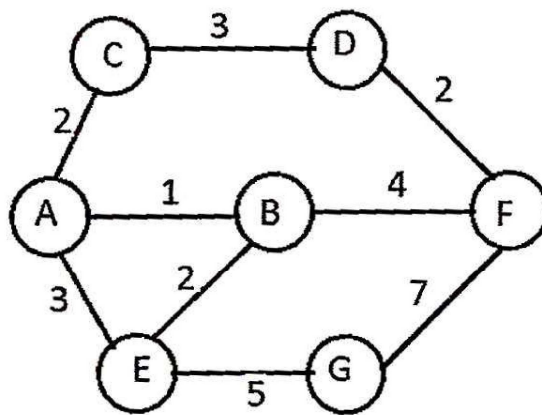


5. (a) Create a Huffman's tree for the given data set and find the corresponding Huffman's codes : [6]

| Data | Weight |
|------|--------|
| A | 10 |
| B | 3 |
| C | 4 |
| D | 15 |
| E | 2 |
| F | 4 |
| G | 2 |
| H | 3 |

(*b*)  Create hash table and resolve collision using linear probing with replacement : [4]

Table Size = 10 Hash Function = key%10

9, 45, 13, 59, 12, 75, 88, 11, 105, 46

(*c*)  Consider hash table in Q5b. After the hash table is 70% full apply rehashing and resolve collision for the same data. [4]

*Or*

**6.**  (*a*)  Construct an AVL search tree by inserting the following elements in the order of their occurrence. Show the balance factor and type of rotation at each stage : [6]

55, 66, 77, 15, 11, 33, 22, 35, 25, 44, 88, 99

(*b*)  Write C++ program to implement priority queue using a Heap Data Structure. [8]

**7.**  (*a*)  Distinguish between logical and physical deletion of records and illustrate it with example. [6]

(*b*)  With the prototype explain the inbuilt functions in 'C' language for reading and writing character and record in a file. [6]

*Or*

8. (*a*) Explain different file opening mode with example in C++. [6]

(*b*) Explain the concept of : [6]

(*i*) Primary Indexes

(*ii*) Clustering Indexes

(*iii*) Secondary Indexes.