DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER IV [INFORMATION TECHNOLOGY]
SUBJECT: (IT-406) DATA STRUCTURE & ALGORITHMS

Examination	**: 3rd Sessional**	**Seat No.**	**: _____**
Date	**: 31/3/2018**	**Day**	**:**
Time	**: 10 – 11:15**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

(a) Create a digital search tree by inserting the following elements: 00001, 10011, 00101, 10010, 00011, 01000 **[3]**

(b) What is the difference between binary trie and binary search tree? Create a binary trie for the sequence given in above question [Q:1 (a)] **[3]**

(c) A hash table of size 10 uses open addressing with hash function h(k)=k mod 10, and linear probing for collision resolution .show the hash table contents after sequential insertion of following 6 values into an empty hash table **[2]**
34, 42, 23, 52, 33, 46

(d) For following set of operations , identify the better representation method from adjacency matrix and adcajency list. Justify your answer. **[4]**
1) Testing whether the edge (u, v) exists in the graph.
2) Listing all outgoing/incoming edges of some node "u".

Q.2 Attempt ***Any Two*** from the following questions. **[12]**

(a) Use Breadth first search technique to identify Strongly connected components in the graph given by figure 1 .Also list the vertices in each component .
Note :- Clearly show all steps . **[6]**

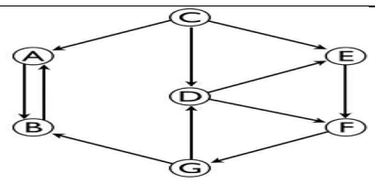


Figure 1

(b) Consider the graph represented by following array based adjacency list ,in figure2. **[2+2+2]**

0	1	2	3	4	5	6	7	8	9	10
5	6	8	10	11	1	0	2	1	3	3

Figure 2

Now answer following :-
1) Draw the corresponding graph G1
2) Draw the DFS spanning tree of G1.
3) Find articulation points in the graph G1. Clearly mention the "low" values of each node.

(c) Consider a graph G is represented using adjacency multilist representation, shown in figure 3. **[1+2+3]**
Now answer following :-
1) Give the set of edges in graph G.
2) Give pictorial representation of the graph G.
3) Give the adjacency matrix and adjacency list representations of G.

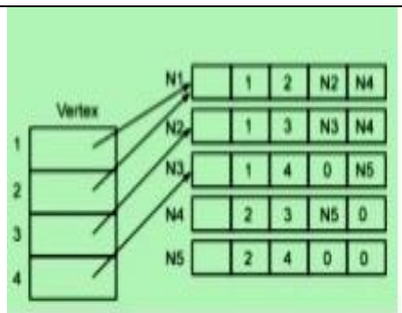
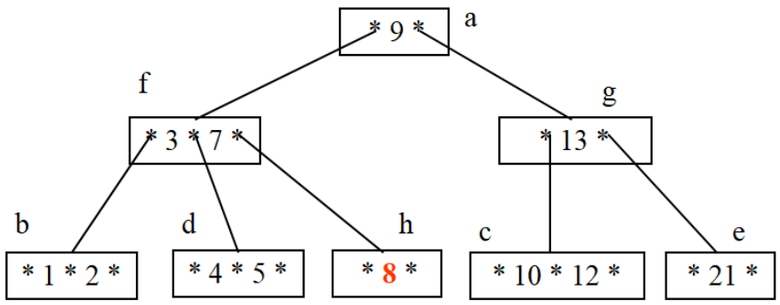


Figure 3

Q.3 (a) Create AVL (Height-Balanced) tree for the following sequences with each rotation specified: **[6]**

3,2,1,4,5,6,7,16,15,14,13,12,11,10,8,9

(b) Consider the following B tree of order 4: **[6]**



Redraw the tree after deleting the keys in given sequence: 2, 21, 10, 3, 4.

OR

Q.3 (a) Show the B-tree of order 3 that results when inserting **[6]**
R,Y,F,X,A,M,C,D,E,T,H,V,L,W,G (in that order).
Draw the trees just before and after each split.

(b) Construct a Red-Black tree for the following data: **[6]**
Insert: 2,1,4,5,9,3,6,7