DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER VII [Information Technology]
SUBJECT: Data Structures & Algorithms (DSA)

Examination	:Third Sessional	Seat No.	: _____
Date	: 11/03/2015	Day	:Monday
Time	11:00 to 12:15	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.   **[12]**

(a) Draw Digital Search Tree (DST) using following data: (where every character   **[2]**
represented using five bits)
00000,01000,00100,00010,11111,10110

(b) In the _____ Traversal we process all of a vertex's descendants before we move to   **[1]**
an adjacent vertex. And in _____traversal it uses a queue to keep track of
vertices which need to be processed.
a) Depth first search b)Breadth first search c) Width First Search 4) Spanning Search

(c) If G is an directed graph with 20 vertices, how many Boolean values will be needed   **[1]**
to represent G using an adjacency matrix? And how many adjacency lists would be
needed for G?
a) 20 b) 40 c) 200 d) 400

(d) From following which are properties of a simple graph.   **[1]**
a). It must be directed.   b). It must be undirected.
c). It has no loops   d). It must have no multiple edges.

(e) A hash table of length 10 uses open addressing with hash function h(k)=k mod 10,   **[2]**
and linear probing. After inserting 6 keys into an empty hash table, the table is as
shown below.

Address	0	1	2	3	4	5	6	7	8	9
key	-	-	42	23	34	52	33	46	-	-

Which one of the following choices gives a possible order in which the key values
could have been inserted in the table?
a) 46, 42, 34, 52, 23, 33   b) 34, 42, 23, 52, 33, 46
c) 46, 34, 42, 23, 52, 33   d) 42, 46, 33, 23, 34, 52

(f) Given a hash table T with 25 slots that stores 2000 elements, the load factor α for T   **[1]**
is _____.
 a) 80 b) 0.0125   c) 8000 d) 1.25

(g) Write down at least two working application of following data structures   **[2]**
1) AVL tree 2) Tries 3) Digital Search tree 4) sorting

(h) Explain different tries structure with example.   **[2]**

Q-2   Attempt any two from the following questions.
[a] Draw the 2-3 tree for following data: **[6]**
1,2,4,5,6,8,11,12,14,15,16,30,50
[note: show each tree during every insertion]

[b] Draw Max heap tree for the following data: **[6]**
10,20,15,50,70,90,110,550,770
[note: show each tree during every insertion]

[c] **[6]**
Draw the 2-3-4 tree for the following data:
10,20,30,40,50,60,70,80,90,110,120,130,150,170
[note: show each tree during every insertion]

Q.3 **Attempt the following questions.** **[12]**
(a) Draw the directed graph that corresponds to following adjacency matrix: **[1]**

	0	1	2	3
0	FALSE	FALSE	TRUE	FALSE
1	TRUE	FALSE	FALSE	FALSE
2	FALSE	FALSE	FALSE	TRUE
3	TRUE	FALSE	TRUE	FALSE

Also Give: **[1]**
I) in-degree and out-degree of each vertex in that graph

II) equivalent adjacency list representation **[1]**

III) Equivalent multi-list representation. **[2]**

IV) Under what conditions would you prefer using an Adjacency List to represent **[1]**
graph over an Adjacency Matrix representation?

(b) Draw the Red black tree for the following data **[6]**
25, 35,45,6,9,8,7,3
[note: show each tree during every insertion]

OR

Q.3 **Attempt the following questions.** **[12]**
(a) Draw the weighted graph that corresponds to following adjacency matrix: **[1]**

```
      A    B    C
A |   0   10   20  |
B |  10    0    2  |
C |   ∞    ∞    0  |
```

Now give algorithm for finding shortest path from "A" to all other vertices. **[3]**
And show its trace on above graph **[2]**

(b) Draw AVL tree for the following data: **[6]**
5,10,15,8,6,9,20
[note: show each tree during every insertion]