N–11642

Register No. | | | | | | | | |

BE Degree Examination November 2015

Third Semester

Computer Science and Engineering

14CST31 – DATA STRUCTURES

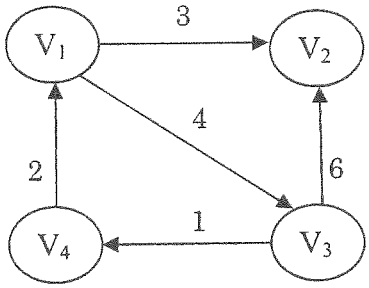
(Regulations 2014)

Time: Three hours Maximum: 100 marks

Answer all Questions

Part – A (10 × 2 = 20 marks)

1. Using structures, declare a node of a doubly linked list.
2. Mention any two applications where linked lists could be used.
3. If stacks are implemented using arrays and if popping is done from an empty stack and pushing is done to a full stack, what would happen?
4. Convert the given expression to postfix notation a*b+c+(d*e+f)*g.
5. Define height and depth of a tree.
6. Mention the different tree traversal strategies.
7. When does collision occur while inserting an element into a hash table? Give an example.
8. "Choosing a pivot element in Quicksort algorithm plays an important role in sorting". Justify.
9. Represent the following graph using adjacency matrix and adjacency list.



10. Define minimum cost spanning tree.

Part – B (5 × 13 = 65 marks)

11. a. With an algorithm explain how insertion and deletion are implemented using singly linked list. (13)

(OR)

b. Write an algorithm to find

i) Element with Minimum value in the list (4)

ii) Element with Maximum value in the list (4)

iii) Element with Odd values in the list (5)

Note: Assume a linked list (May be doubly or singly) with n numbers is available Write algorithms to perform the above operations on the list.

12. a. Propose a data structure that supports the push and pop operations along with a third operation Find Max, which returns the greatest element in the proposed data structure. (13)

(OR)

b. Explain how insertions and deletions are performed in Circular quene using linked list implementation. (13)

13. a. i) Show the steps to insert the following elements into an initially empty binary search tree 3, 1, 4, 6, 9, 2, 5,7. (6)

ii) Build as AVL tree which is initially empty using the values 2,1,4,9,3,6,7,5. (7)

(OR)

b. i) Build a heap tree with the following set of data 19, 55, 44, 98, 67, 48, 95, 66, 70, 69, 30, 24, 99, 82. (8)

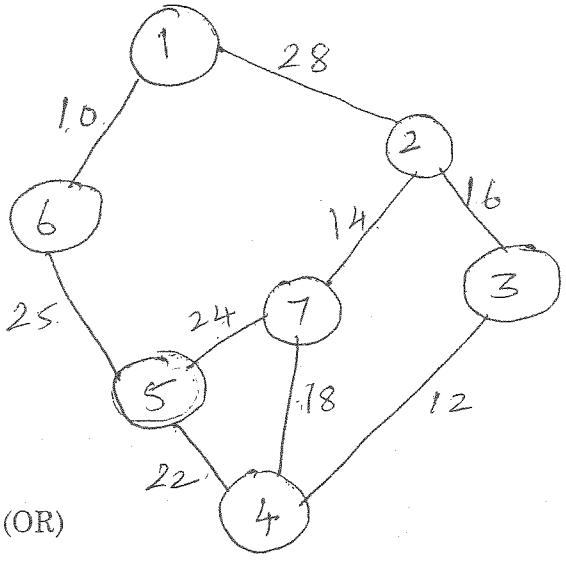
ii) Compare and contrast a leftist heap and a binary heap. (5)

14. a. Sort 3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5 using quick sort. Compare its performance with other sorting techniques. (13)

(OR)

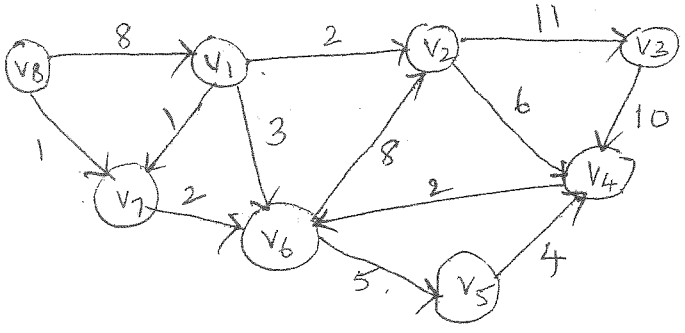
b. Identify the different collision resolution strategies while interesting in element in to a hash table. Give a brief account on each of them. Apply the strategies for the following values and show the results: 4371, 1323, 1678, 4193, 8124, 4096, 2317, 1469, 1211, 3674 and the hash function is $h(X) = X(\text{mod } 10)$. (13)

15. a. Find the minimum cost spanning tree using Prim's algorithm and verify the result with Kruskal's algorithm (13)



(OR)

b. Give the pseudo code for Dijkstra's algorithm and determine the shortest path of the following graph using Dijkstra's algorithm from vertex V_1 to Vertex V_5 (13)



Part – C (1 × 15 = 15 marks)

16. a. i) Sort the following numbers using Merge sort 310, 285, 179, 652, 351, 423, 861, 254, 450, 520. (8)

ii) Build an expression tree for the following expression: $(a + b * c) + c * (d * e + f) / g)$. Also give the prefix and postfix expressions that corresponding to the built tree. (7)

(OR)

b. i) Suppose in the course curriculum of B.Tech degree in Computer Science, the various courses and the prerequisites are listed below. Draw a graph pertaining to the above mentioned information. From the graph, obtain a topological sorting depicting the order in which the courses can be registered by a student. (8)

Course	Prerequisite
C31	C25
C32	C21, C14
C33	C24
C34	C22
C35	C25
C21	C12
C22	C13
C23	C12, C13, C14
C24	C11
C25	C15
C11, C12, C13, C14, C15	No prerequisite is required.

ii) What are the different graph traversal techniques? Examine the approach used by these techniques for graph traversal. (7)