

## POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2021

Programme: BE

Full Marks: 100

Course: Data Structure and Algorithms

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Define Abstract Data type with example. Explain which data structure are suitable for the following problems with proper reasons 8
  - i. Evaluating the arithmetic expression
  - ii. Process scheduling by operating systems.
  - iii. Developing the social networks.
- b) Write the advantages of Postfix expression over the Infix expression, while processing by computer system. Convert the given expression into Postfix expression showing content of stack at each step.  $(A+B*C/D)+E*F-(G*H+I-J)$  7
2. a) Write algorithms to en-queue and de-queue in a circular queue. 8
   
b) What is the advantage of an array over linked list and what is the advantage of linked list over an array? Implement a simple singly linked list with three nodes containing data 11, 22 and 33 using C or C++ code. 7
3. a) Write algorithms for push and pop operations on a stack using linked list implementation. 7
   
b) Write algorithms to insert and delete a node at the end of singly linked list. 8
4. a) Explain the necessity of balancing a tree. How are the four different rotations applied to rebalance the AVL tree? Explain with example. 8
   
b) Generate the Huffman Code for the following character with the given frequency. 7

Character	a	b	c	d	e
Frequency	8	6	3	4	15

5. a) Explain the insertion sort with an appropriate example. Also state its time complexity. 7
- b) What is collision in hashing? What are the collision resolving techniques in hashing? Explain about separate chaining. 8
6. a) Define graph and digraphs. Explain Adjacency matrix representation of graph with examples in undirected and directed graph. 8
- b) Define the minimum spanning tree. Explain Kruskal's algorithm for finding the minimum spanning tree. 7
7. Write short notes on: (Any two) 2×5
- a) TOH problem
- b) Divide and conquer algorithm
- c) Big O Notation

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POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Data Structure and Algorithm

Semester: Fall

Year : 2020  
Full Marks: 100  
Pass Marks: 45  
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Why do you need data structure? Data Structure is an abstract data type. Do you agree with this Statement? If so, explain with example. 7

b) Why do you convert infix expression to postfix expression? Explain how do you use stack to convert the following infix expression into postfix:  $A + (B * C - (D / E^F) * G) * H$

Where  $^$  is power operator.

2. a) What are the shortcomings of linear queue? How are they solved in circular queue? Write algorithms for enqueue and dequeue operations in circular queue. 8

b) What is the advantage of doubly linked list over singly linked list? Write algorithms to insert and delete a node at the beginning of singly linked list. 7

a) Write a simple program in C or C++ to create a singly linked list containing three nodes. The first node stores 11, second node stores 22 and third node stores 33. Also display the data of nodes. 8

b) Write the cases in which you will use iteration and recursion. Explain how you will solve the Tower of Hanoi problem. 7

a) Why do you need a balanced tree? Create an AVL tree from the given set of values: 5, 7, 13, 9, 6, 3, 14, 10, 4. 8

b) What is the advantage of variable length encoding? Construct Huffman tree and generate code for the following symbol with their frequency given below. 7

Symbol	C	D	E	K	L	M	U	Z
Frequency	32	42	120	7	42	24	37	2

5. a) Explain how you use divide and conquer strategy to sort the following list using quick sort : 7, 9, 45, 12, 56, 90, 3, 8, 50. 8

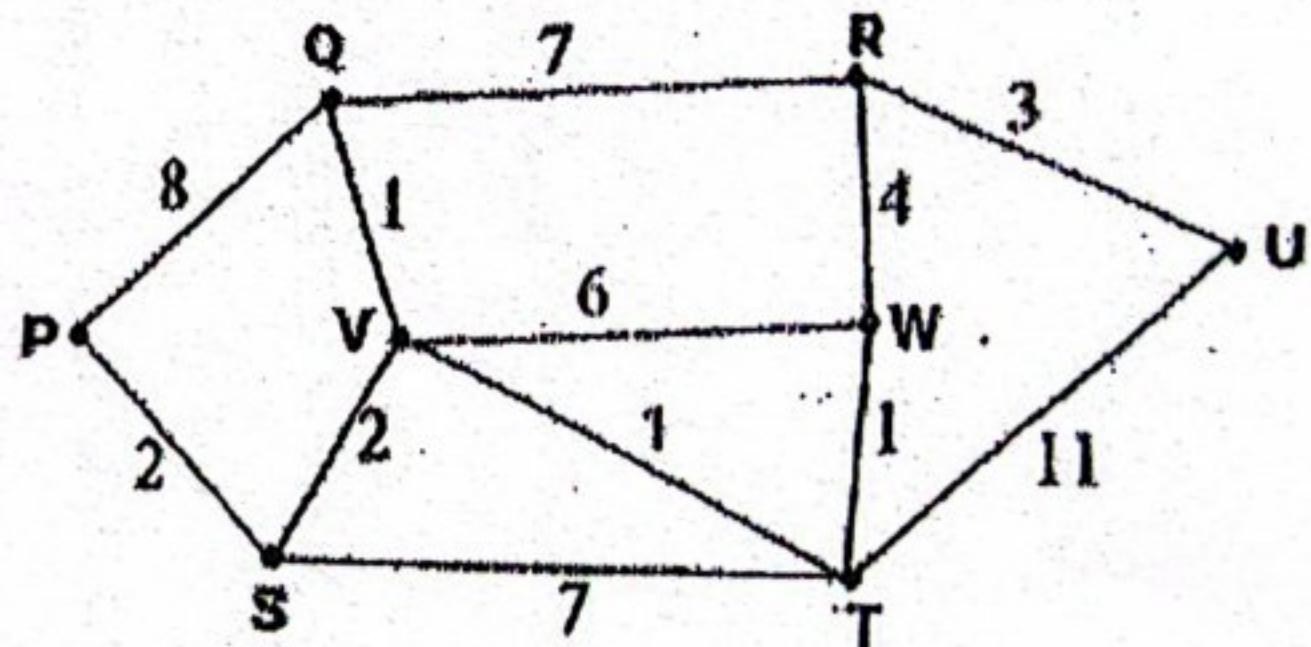
Also write the best, average and worst case time complexity of quick sort for simple partition case.

b) What is the purpose of hashing? For given input {2, 17, 49, 37, 25, 67, 82, 4, 9, 3} and a hash function  $h(x) = x \bmod 10$  show the resulting:

- i. Hash table using linear probing
- ii. Hash table using chaining

6. a) What is directed and undirected graph? Explain adjacency matrix and adjacency list representation of graph, with suitable example. 7

b) Write Dijkstra's Algorithm. Find the shortest path from P to U using Dijkstra's algorithm. 8



7. Write short notes on: (Any two) 2x5

- a) Binary search
- b) Kruskal's Algorithm
- c) Big O Notation

## POKHARA UNIVERSITY

Level: Bachelor                      Semester: Fall                      Year : 2019  
Programme: BE                      Full Marks: 100  
Course: Data Structure and Algorithm                      Pass Marks: 45  
                                        Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Give ADT of matrix. Show a sample product function to find product of two matrices.                      7  
b) What is the condition of stack overflow & stack underflow? Write down the module for stack pop & push operation.                      8
2. a) What are the limitations of circular queue? Write an algorithm to enqueue and dequeue in circular queue.                      8  
b) Write a module function to insert and delete an item in the queue in circular representation. You must state assumption clearly that are needed.                      7
3. a) Define recursion. Illustrate the steps to solve Tower of Hanoi (TOH) problem with its solution for 3 discs.                      7  
b) Explain Algorithm and its types.                      8
4. a) Construct a Binary search tree after inserting the following values.                      7  
12        5        15        13        17        3        7        1        9  
Show your binary tree after deletion of  
7        15                      8  
b) What is the benefit of having a binary tree that is Height Balanced? Explain all possible rotations while constructing a height balanced tree using example for each.                      8
5. a) Write an algorithm for insertion and deletion of the node in the end of the singly Linked list.                      7  
b) Construct a heap from the following data and illustrate heap sort.                      8  
56, 103, 88, 24, 77, 89, 53, 47, 90.                      8
6. a) What do you mean by transitive closure of the graph? How warshall's algorithm is used to find the transitive closure of a graph. Clarify with suitable example.                      1

- b) What do you mean by spanning tree? Explain Dijkstra's algorithm to find the shortest path in graph with suitable example.
7. Write short notes on: (Any two)
- Explain efficiency of Sorting
  - AVL Tree
  - Link list as an ADT
- 2x5

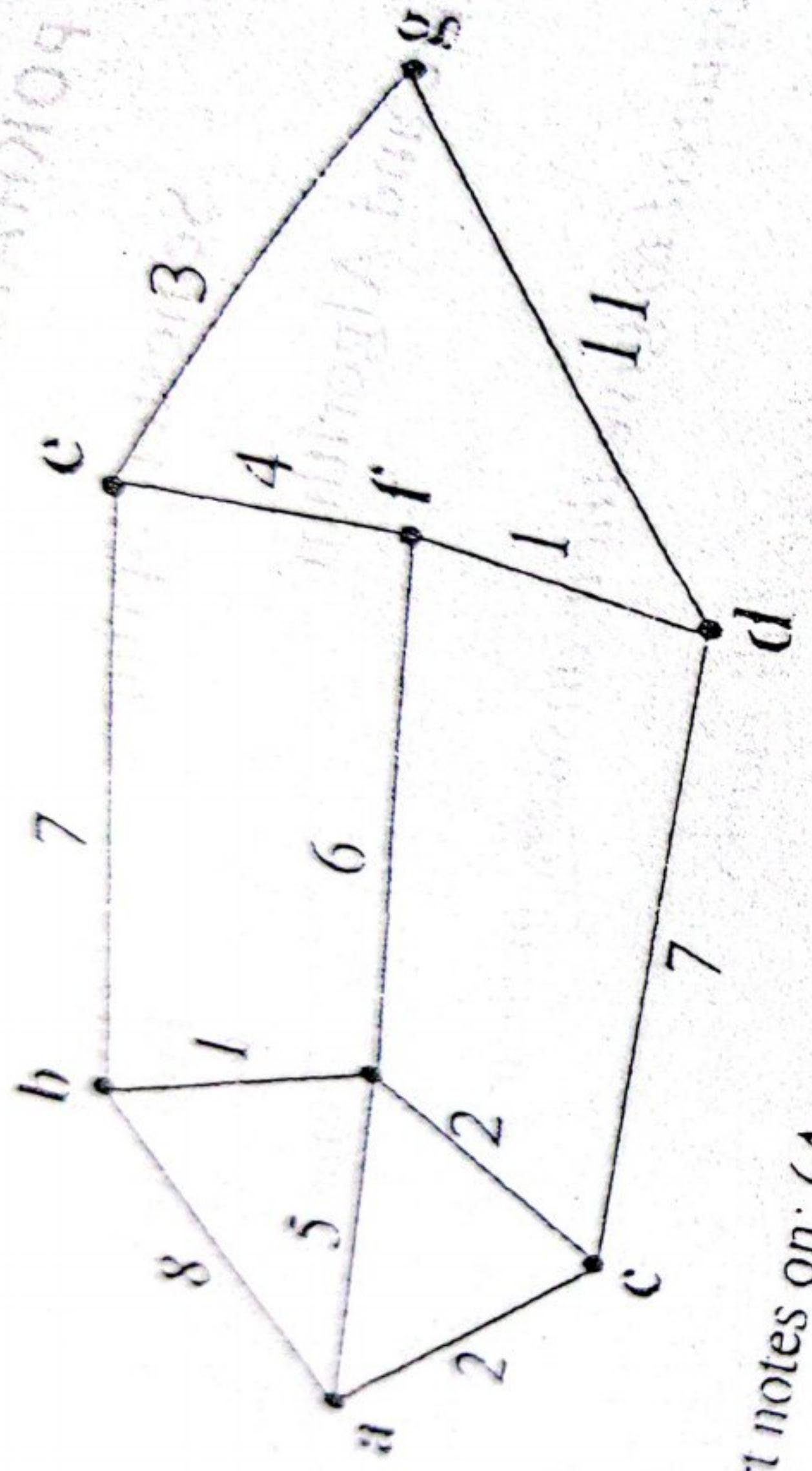
Level: Bachelor Semester: Spring Year : 2019  
 Programme: BE Full Marks: 100  
 Course: Data Structure and Algorithm Pass Marks: 45  
 Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

- 7
- a) Differentiate Linear and non-linear data structures with their traversal methods. 8
- b) Define infix and postfix expression. In an application, the client request you to process their data in a particular format. The format states that the in the data count of 1000, first data entered in the application is the last data that comes out of the application. Write down the insert & delete mechanism for manipulation of data. 8
- a) What is double ended queue? Write down the algorithm to implement circular queue for both insertion & deletion approach. Derive the explicit equation of ToH using Recursive Relation. 7
- b) Let LIST be a linked list in memory. Write a procedure which adds a given value k to each element in LIST. Explain the given value k to each element in LIST. 7
- a) Define list. List down the operations performed in list. Explain dynamic implementation of list with suitable example. 8
- b) Suppose the following letters is inserted in order into an empty binary search tree: U, V, P, Q, M, N, O, R, K, W, C, D.
- i. Find the final tree T and 7
- ii. Find the post order traversal of T
- a) Explain the Huffman algorithm. Show your own example of Huffman search steps to search 46 from the \_\_\_\_\_ 7
- b) Explain the Huffman algorithm. Show steps to search 46 from the \_\_\_\_\_ 7
- a) Distinguish linear-and-binary-search. Show steps to search 46, 85, given data 7, 13, 36, 42, 43, 46, 85. 8
- b) Write a program to sort the set of strings in ascending order by using bubble sort method. 8
- a) Explain various collision resolution techniques in hashing with example. 7
- b) Define graph traversing? Find the shortest path from a to g using Dijkstra's algorithm. 7



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Write

7. Write short notes on: (Any two)
- Adjacency matrix
  - Divide and Conquer algorithm
  - Radix Sort

POKHARA UNIVERSITY

**Level:** Bachelor      **Semester:** \_\_\_\_\_  
**Programme:** BE  
**Course:** Data Structure and Algorithm

**Year : 2018**  
**Full Marks: 100**  
**Pass Marks: 45**  
**Time : 3hrs**

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

- a) Define ADT with example. What are the data structures used in the following areas: Print jobs in computer, Network data model & Hierarchical data model? 8

b) What is the advantage of postfix expression over infix expression? 8

c) Evaluate the given expression using prefix notation.

$$A * (B + C) - (D / E)$$

(Assume A = 5, B = 6, C=2, D=12 and E=4) 8

a) Write differences between linear queue and circular queue. Write an algorithm for insert and delete operations for circular queue. 7

b) How many steps are required to solve TOH problem? Write the steps to solve TOH problem for 4 discs giving pictorial illustrations. 7

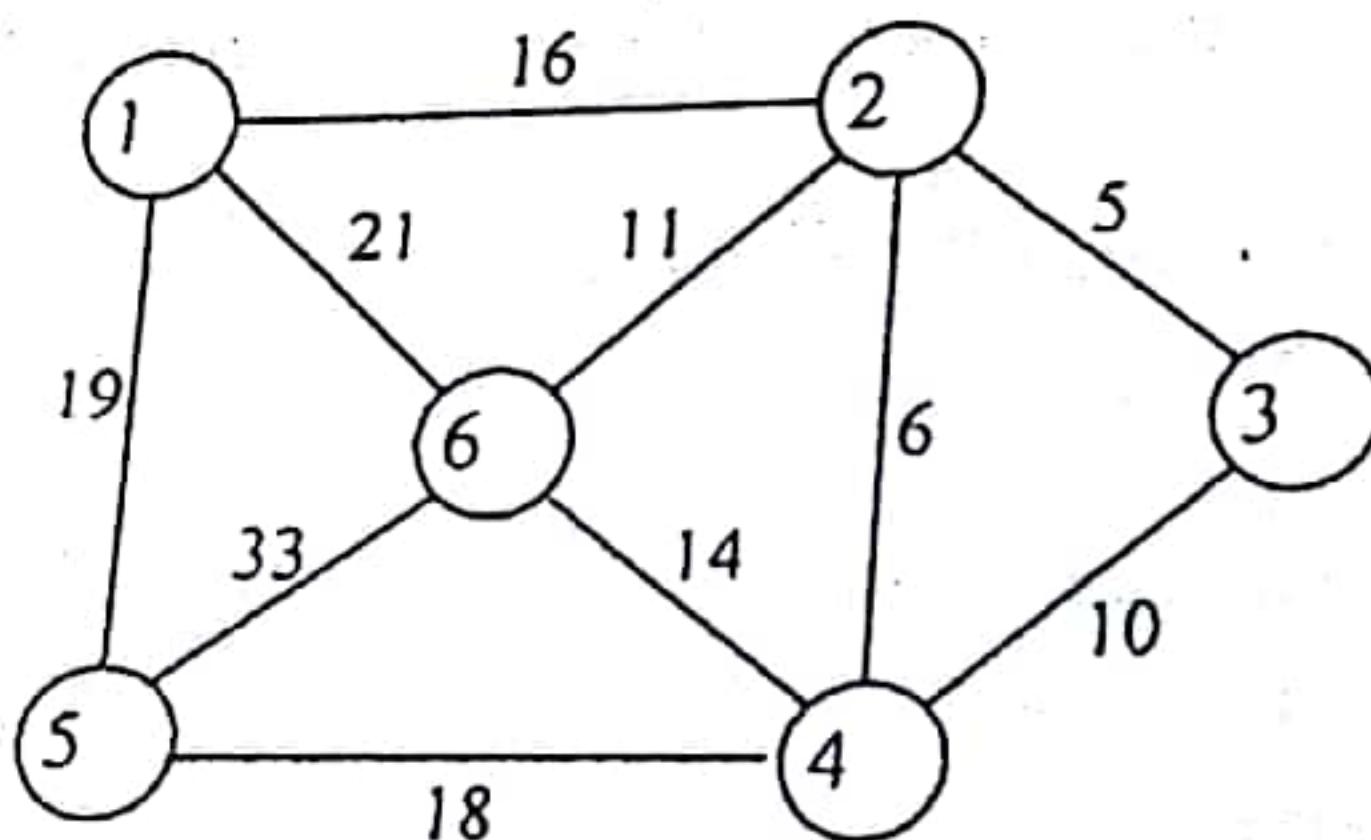
a) Differentiate between static and dynamic list. Write an algorithm to insert a node at the end doubly linked list. 8

b) What is circular linked list? Write an algorithm for push and pop operations on Stack using linked list. 7

c) Suppose the following list of letters is inserted in order into an empty binary search tree. J R D T G E A M H F Q U B. Find the final tree and perform different tree traversals. 8

d) Write a structure definition to represent AVL tree. Create an AVL tree from the given set of values. 3,5,11,8,4,1,12,7,2 8

5. a) Trace quick sort for following set of values. 8  
43, 16, 11, 89, 35, 47, 1, 92.  
b) Define collision. What are the techniques used for collision resolution in hashing. Explain with example. 7
6. a) What do you mean by spanning tree of graph? Find the minimal spanning tree of the following graph using Kruskal's algorithm. 7



- b) Explain with suitable example, BFS and DFS traversal of a graph. 8
7. Write short notes on: (Any two) 2x5
- Divide and Conquer Algorithm
  - Radix Sort
  - Worst Case Complexity

# POKHARA UNIVERSITY

Level: Bachelor  
 Programme: BE  
 Course: Data Structure and Algorithm

Semester: Spring

Year : 2018  
 Full Marks: 100  
 Pass Marks: 45  
 Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Define abstract data type? Justify the statement "Data Structure is the backbone of software programming". 8
- b) Write the advantages of Postfix expression over the Infix expression. Convert the given expression into Postfix expression showing the content of stack at each step.  $(A+B*C/D)+E*F-(G*H+I-J)$ . 7
2. a) Differentiate between recursion and iteration. Write recursive mechanism (algorithm) for solving Tower of Hanoi problem. 7
- b) Explain the advantages of doubly linked list implementation. Write algorithm for insertion and deletion in stack as linked list. 8
3. a) Explain with example the different cases of balancing AVL tree after inserting a node that violates the property. 7
- b) Construct a BST from the following data and show VLR, LVR, LRV and RVL traversals 14,10,17,12,11,20,18,25,20,8,22,23. 8
4. a) Define Queue. Mention the primitive operations of Queue and write the module for enqueueuer and dequeuer in Circular Queue. 7
- b) Generate the Huffman Code and also draw the Huffman tree for the following unique Character "POKHARAUNIVERSITY". 7
5. a) What is sorting? Write the algorithm for quick sort. 8
- b) What is collision in hashing? What are the collision resolving techniques in hashing? Explain about separate chaining. 8
6. a) Define graph and digraphs. Explain Adjacency matrix representation of graph with examples in undirected and directed graph. 8
- b) Define the minimum spanning tree. Explain Kruskal's algorithm for finding the minimum spanning tree. 7

7. Write short notes on: (Any two) *напишите краткие заметки*

- a) TOH problem
- b) Deterministic and non-deterministic algorithm
- c) Static vs dynamic list

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2017

Programme: BE

Full Marks: 100

Course: Data Structure and Algorithm

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) What is Abstract Data Types (ADT)? Explain the different primitive operations to be performed on the data structures. 5
- b) How data structure is different from data types? Explain the meaning of linear and nonlinear data structure with suitable example. 5
- c) List the applications of stack in computing as well as non-computing world. Write down the condition to check whether the element in linear queue is last element or not. Also mention how do you find the number of elements present in any queue? 5
2. a) Write an algorithm to convert infix expression to postfix expression. 7  
Convert the following postfix expression into infix expression:  
 $abc-+de-fg-h+/*$  8
- b) What is double ended queue? How does circular queue overcome the shortcoming of linear queue? Write an algorithm for traversing in circular queue. 8
3. a) What are the advantages and disadvantages of Linked list? Write an algorithm to delete a node in specified position of singly linked list. 7  
b) What are the applications of linked list? Explain with suitable example to perform the addition of two polynomials using linked list. 8
4. a) Construct a BST from the following elements inserted in an order 7  
39, 45, 30, 60, 42, 35, 25, 32, 44. Also perform different tree traversals. 8  
b) What is weight balanced tree? Perform the AVL algorithm for following words are inserted in an order in an empty tree. BRIJESH, FIZZA, IMRAN, NAVIN, LOVELY, PRITY, SAMIT 7
- a) How recursion is different from iteration. Present your argument with 7

suitable example for following statement: "Solving Fibonacci series using recursion is not efficient as compare with iteration".

- b) What is stable and unstable sorting? Trace the quick sort algorithm for 8 following unordered list.

25, 30, 18, 16, 45, 40, 60, 20, 10, 7, 30, 100, 12, 14.

6. a) Compare set, matrix and linked list representation of graph. What are 7 the difference between traversing in graph and traversing in tree? Explain with suitable example.

- b) 76, 26, 37, 59, 21, 65, 75, 49, 11. From above data, store the values 8 into hash table with 10 positions, using division method (key% table size) of hashing and the linear probing and chaining method for resolving collision.

7. Write short notes on: (Any two) 2x5
- a) Heap sort
  - b) Transitive closure
  - c) Big OH notation

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Data Structure and Algorithm

Semester: Spring

Year : 2017  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Why data structure is needed? Explain the advantages of abstract data typing. 7
- b) Write an algorithm to evaluate an arithmetic expression in Postfix string. Apply the algorithm to evaluate: AB + C - BA + C\$ - (assume A = 1, B = 2, C = 3). 8
2. a) Write an algorithm to insert an element into the queue and to delete an item from queue. 7
- b) Define doubly linked list. Explain the advantages and disadvantages of linked list over array. 8
3. a) Write a program to implement a stock using array. (you can use any programming language such as C or C++ or Java) 8
- b) Write recursive function/algorithms for Binary Tree Traversals. 7
4. a) Define an AVL tree. Why do you balance a tree? Explain with an example. 7
- b) Why is quick sort better than other sorting algorithms? What might be the cases where quick sort isn't better? 8
5. a) Given input {1, 16, 49, 36, 25, 64, 0, 81, 4, 9} and a hash function  $h(x) = x \bmod 10$ .
  - i. Draw Hash table using open addressing
  - ii. Draw Hash table using chaining 7
- b) What is external sorting? Write a C function to sort a given array of positive integers using bubble sort. 8
6. a) What do you mean by Shortest Path? Write Disjkstra's shortest path algorithm and explain the algorithm with suitable example. 8

- b) Explain adjacency matrix and adjacency list representation of graph using an example
7. Write short notes on: (Any two)
- a) Recursion and ToH
  - b) Big O Notation
  - c) Minimum Spanning Tree

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Data Structure and Algorithms

Semester: Fall

Year : 2016

Full Marks: 100

Pass Marks: 45

Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

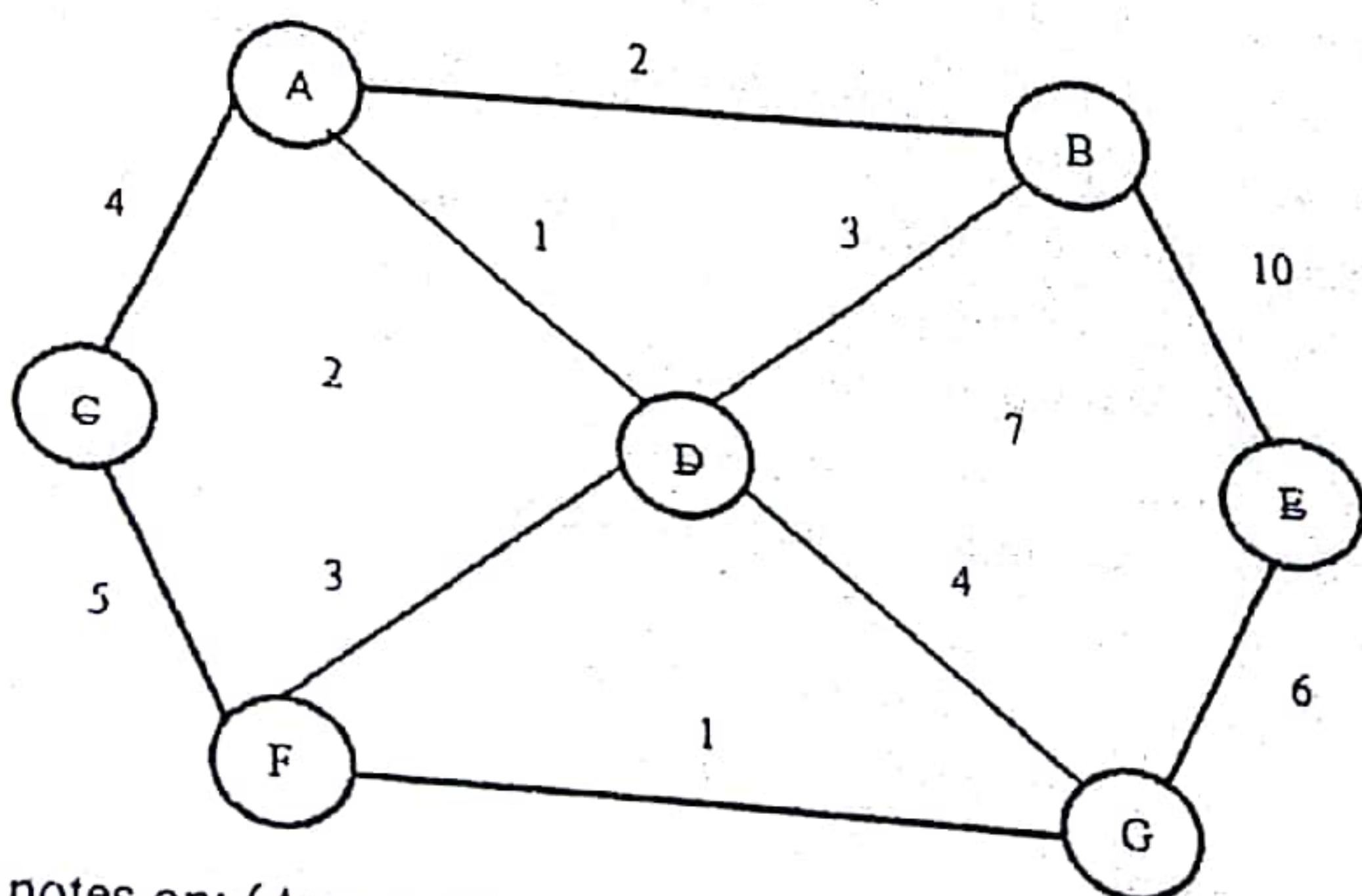
*Attempt all the questions.*

1. a) Discuss the concept of data structure. Explain various ways of representing rational number as an ADT. 7
- b) Write an algorithm for conversion of infix to postfix expression. 5
2. a) Convert the following infix expression to postfix in tabular form:  
$$(a-b/c\$d)*e/(f-g*h)$$
 7
- b) Differentiate between stack and queue. How do you insert and delete an element in a circular queue? Explain with an example. 8
- b) Differentiate between static and dynamic list. Write an algorithm to insert an element into a contiguous list. 8
3. a) Define Enqueue and Dequeue. Explain four types of dequeue with suitable example. 7
- b) What is recursion? What are its advantages and disadvantages? Give the difference between recursion and iteration by taking reference of factorial function. 7
4. a) Design a Binary tree whose pre-order and in-order traversal sequences are FAEKCDHGB and EACKFHDBG respectively. 8
- b) What is height balanced tree? Insert 3,2,1,4,5,6,7 in an empty AVL tree. 8
5. a) Define Hash Function. Suppose, In a company with its 68 employees, every employee has 4 digit employee number and also assume that memory table has 100 address starting from 00, 01, 02, 03,.....99. The employee numbers are 4205, 3605, 7777, 8282, 7626, 0234, 2522, 5228, 5175, 1002. Perform division method, folding method and mid square method. Allocate the desired result in memory. 7

- b) Explain selection sort. Sort the following list using heap sort:  
31, 41, 5, 9, 36, 53, 58, 97
6. a) Explain Warshall's algorithm to find the transitive closure of a digraph. For the adjacency matrices A given below
- draw the corresponding digraph
  - find the matrix T of the transitive closure using the digraph implementation of Warshall's algorithm.

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

- b) Define shortest path algorithm. Find the shortest path from C to E using Dijkstra Algorithm.



7. Write short notes on: (Any two)
- Deterministic and Non-Deterministic algorithm
  - Quick Sort
  - Tree traversal.

7

2x5

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Data Structure and Algorithm

Semester: Spring

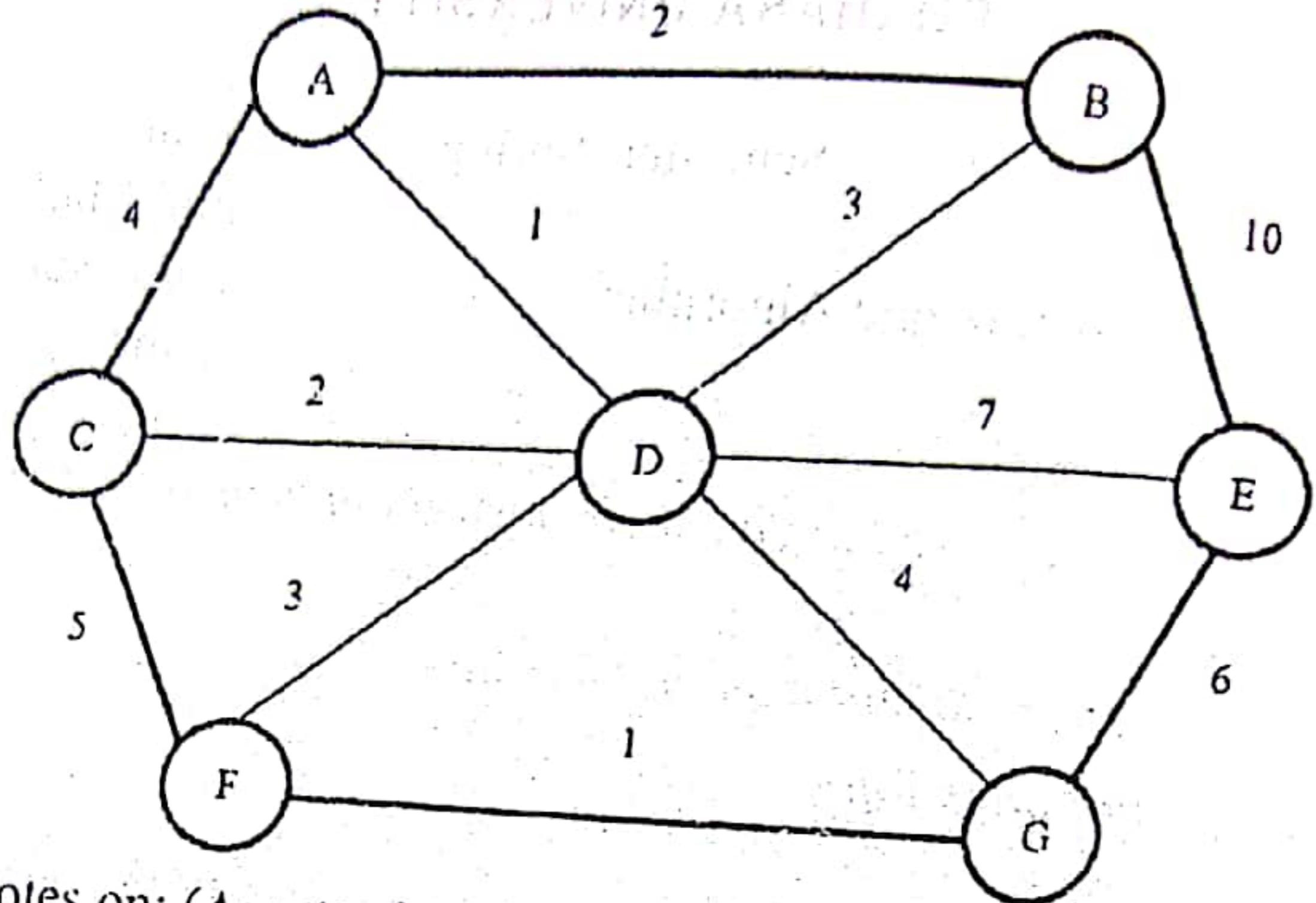
Year : 2016  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Differentiate between data type and data structure. What are the two parts of ADT definition? Explain. 7
- b) Differentiate between infix, prefix and postfix expression. Write an algorithm to evaluate an arithmetic expression in Postfix string. 8
2. a) Define Circular Queue. Write an algorithm to add and delete an item in the circular queue. 8
- b) List basic five operations of linked list. Write code for inserting new node at beginning of the list. 7
3. a) What are the advantages and disadvantages of linked list implementation over array implementation? Write algorithm for enqueue and dequeue operations on Queue using linked list. 8
- b) Explain B+ trees giving some of its application. Write the algorithm to delete an element from B+ tree. 7
4. a) Mention advantages and disadvantages of recursive algorithms over iterative solutions. 5
- b) Trace quick sort algorithm for the data: 10, 22, 31, 4, 15, 28, 17, 6. 10
5. a) Discuss the efficiency of binary searching. 5
- b) Define hashing and collision. Illustrate three types of collision resolution techniques with an example. 10
6. a) Differentiate between Graph and Tree. Write an algorithm for Depth-First Traversal of graph. 7
- b) What is minimum spanning tree? Explain Kruskal's algorithm to get minimum cost spanning tree of following graph. 8



7. Write short notes on: (Any two)

- Priority Queue
- Mean Vs Max Heap
- Big O notation

सुगम स्टेसनरी सप्लायर्स एण्ड फोटोकपी सर्विस  
 बालकुमारी, ललितपुर १८४७५१९५१२  
 NCIT College

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Data Structure and Algorithm

Semester: Fall

Year : 2015

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Differentiate ADT and C++ class. Write an ADT for natural numbers. 7
- b) Trace the algorithms to convert postfix expression with the following infix expression 8  
 $((A+B)-C*D/E)\$*(H-I)*F+G$   
 Evaluate postfix expression obtain from above with the following values for  
 $A=4, B=2, C=4, D=3, E=8, F=2, G=3, H=5$  and  $I=1$ .
2. a) What are the difference between stack and queue? Write enqueue and dequeue algorithm of circular queue. 8
- b) What is doubly linked list (DLL) and Circular Linked List (CLL)? 7  
 Represent the following polynomial equation using singly linked list.  
 $P(x,y,z)=3x^3yz - 5x^2y^3 + 5x^2y^3 + 8y^2x^2z - 4xy^7z^3 + 2x^7yz$
3. a) State the advantage of a linked list over contiguous list. Write the steps involved in deleting an item in a contiguous list. 8
- b) How the representation of data in memory is cheaper using linked list than in array? Write an algorithm to search an element and insert a node at the specified position in a single linked list. 7
4. a) What is tree traversal? Explain preorder, inorder and postorder tree traversal by constructing expression tree of the given expression:  $b*b-4*a*c$ . 7
- b) How does the Huffman algorithm work? Explain with a complete example. 8
5. a) Sort the following data using merge-sort algorithm. 66, 33, 40, 22, 55, 88, 60, 11, 80, 20, 50, 44, 77. 7
- b) What is hashing. Explain in detail about the technique used for 8

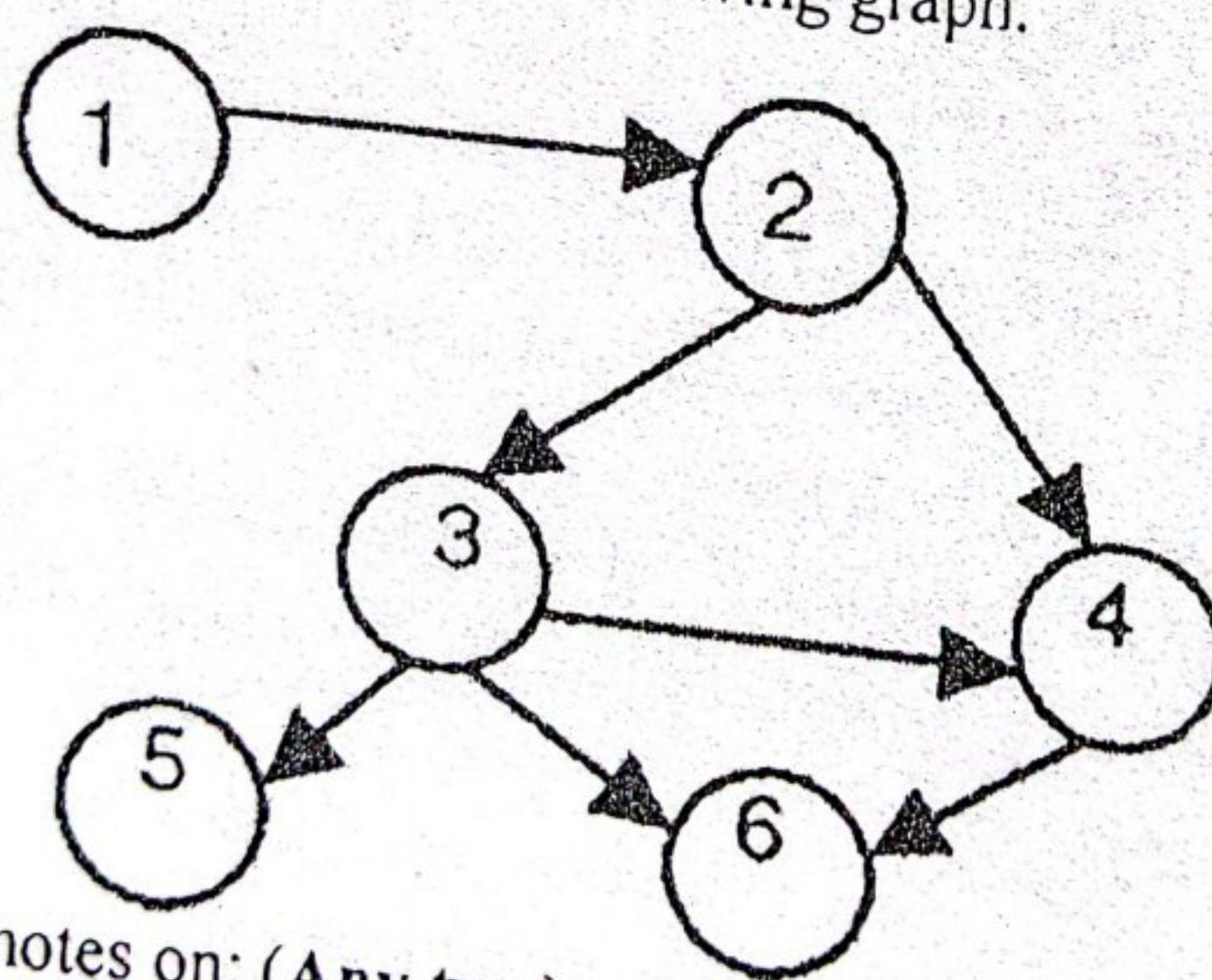
collision resolution.

6. a) Define graph and diagraph?

Let G be the graph represented by this adjacently list.

Vertex	Adjacent list
A	F
B	C
C	B
D	A,B
E	C,D,
F	E

- Draw G.
  - Is G a directed graph?
  - Is G weakly connected?
  - Give the adjacency matrix for G.
- b) Define graph, connected graph and spanning tree. Perform the topological sort from the following graph.



7. Write short notes on: (Any two)
- Game Tree.
  - Recursion versus Iteration.
  - Big O Notation.

2×5

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2015

Programme: BE

Full Marks: 100

Course: Data Structure and Algorithm

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) "To write an efficient program, we should know about data structure." 5  
Explain the above statement.
- b) What is ADT? Explain different primitive operations that we can perform on data structures. 5
- c) List the applications of stack in computing as well as non-computing world. 5
2. a) What is infix, prefix and postfix expression? Convert the following infix expression into postfix expression showing the content of stack in each step. 7  

$$P = A + ( B * C - ( D / E \$ F ) * G ) * H$$
- b) Compare circular queue with linear queue. Write Enqueue and Dequeue algorithm of circular queue. 8
3. a) How dynamic list is different from static list? What are the primitive operations that we can perform in a list? Explain with suitable example. 7
- b) What is doubly linked list (DLL) and Circular Linked List (CLL)? Write an algorithm to insert a node in specified position of doubly linked list. 8
4. a) Define BST. Construct a BST using the following data U, N, I, V, E, R, S, I, T, Y, O, F, P, O, K, H, A, R, A.  
Also Perform pre-order, in-order and post-order traversal 7
- b) Generate the Huffman code for the symbol A, B, C, D, E, F with the probability of occurrence are 0.2, 0.28, 0.2, 0.16, 0.12, 0.04 respectively. Also construct Huffman tree. 8
5. a) Why do we need to balance the tree? Perform the balancing algorithm 7

according to AVL for the following sequence of numbers.

- b) Differentiate bubble sort with selection sort. Explain the divide and conquer approach in quick sort algorithm. Trace the algorithm to sort the following unordered list. 25, 30, 18, 16, 45, 40, 60, 20, 10, 7, 30, 100, 12, 14.
6. a) Define graph. What are the difference between traversing in graph and traversing in tree? Explain with suitable example.
- b) Define Hash Collision. 66, 47, 87, 90, 126, 140, 145, 153, 177, 285, 393, 395, 467, 566, 620, 735. From above data, store the values into hash table with 20 positions, using division method ( $\text{key \% tablesiz}$ ) of hashing and the linear probing and quadratic probing method for resolving collision.
7. Write short notes on: (Any two)
- a) Recursion vs Iteration
- b) Deque
- c) Serial and Parallel algorithm.

2x5

**POKHARA UNIVERSITY**

Level: Bachelor  
Programme: BE  
Course: Data Structure and Algorithm

Semester: Fall

Year : 2014  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

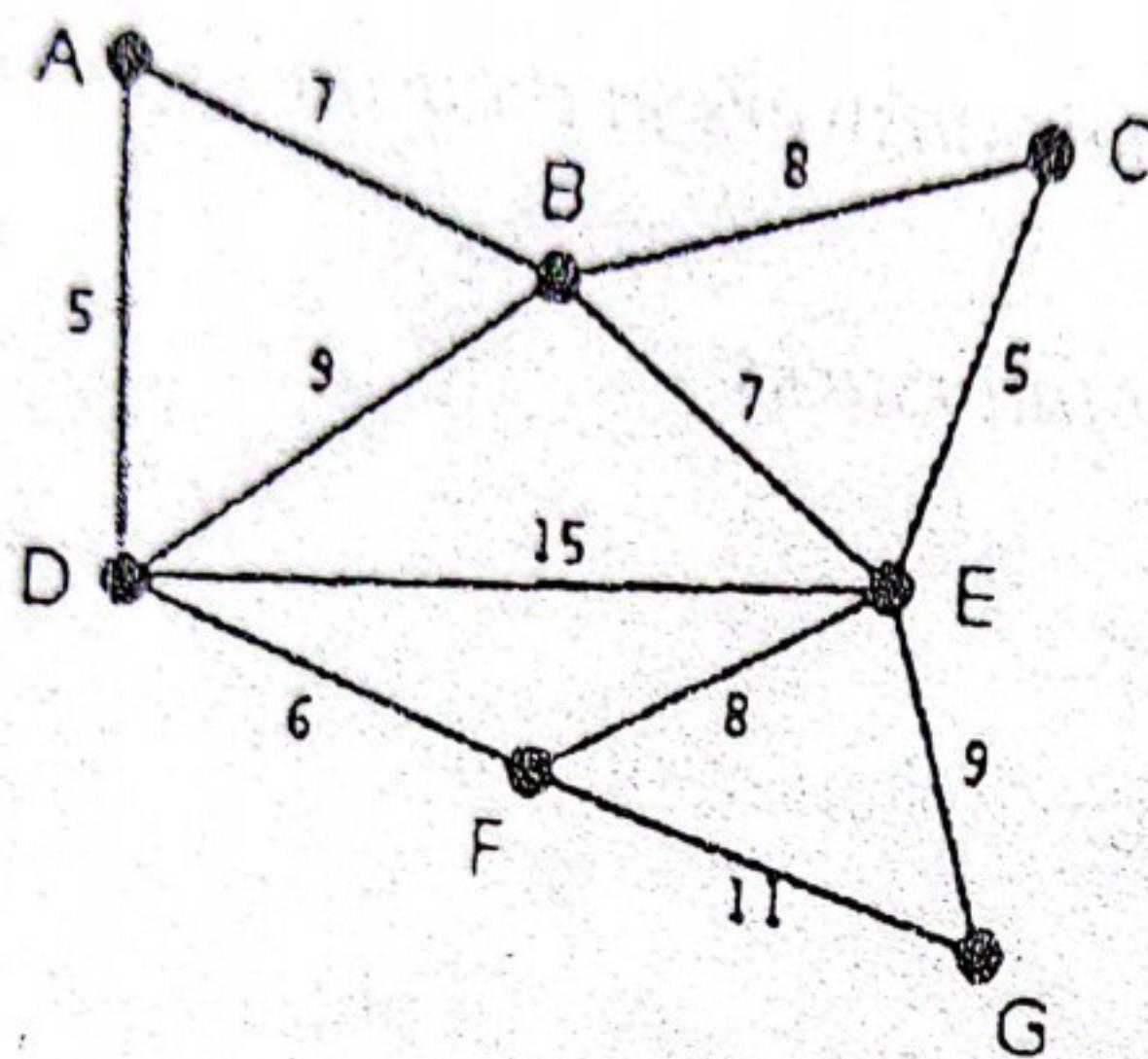
1. a) Define data structure. Explain the different operations to be performed on data structure. 7
- b) Write the algorithm to convert the infix expression to postfix expression to postfix expression using stack implementation. Evaluate the following expression 8  

$$A \ B \ C \ / - D \ E^* \ F \ - * \ (\text{Where } A=6, B=5, C=2, D=3, E=4 \text{ and } F=1)$$
2. a) Write an algorithm to insert an item in circular queue in array implementation. Write assumptions you need? 7
- b) Define list. Describe merits of linked list over contiguous list. Write an algorithm to insert an item in a static list. 8
3. a) Differentiate between singly linked list and doubly linked list. Write an algorithm for push and pop operations on stack using linked list. 8
- b) Construct a binary tree from the following inorder and preorder sequence. 7  
 Preorder: F A E K C D H G B  
 Inorder: E A C K F H D B G
4. a) Write an Algorithm to build an Huffman Tree. Construct a Huffman tree for the following data item and Frequency 3+5

Data item	A	B	C	D	E	F	G	H
Frequency	22	5	11	19	2	11	25	5

- b) Sort the following data by heap sort method. 7  
 40, 32, 75, 20, 65, 48, 88
5. a) Define Selection sort. Trace Quick sort algorithm for the data: 2+5

- 25, 57, 48, 37, 12, 92, 86, 33  
b) Search using Binary search Technique  
75, 151, 203, 275, 318, 489, 524, 591, 647, 727  
Search 275 and 727.
6. a) Define greedy algorithm. Find minimum spanning tree for the given graph using Kruskal's algorithm.



- b) Define graph traversal. Differentiate between DFS and BFS with an example.
7. Write short notes on: (Any two) 2+  
a) Big O notation  
b) Recursion Vs Iteration.  
c) Hash Functions and hash tables. 2x

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE

Course: Data Structure and Algorithm

Semester: Spring

Year : 2014

Full Marks: 100

Pass Marks: 45

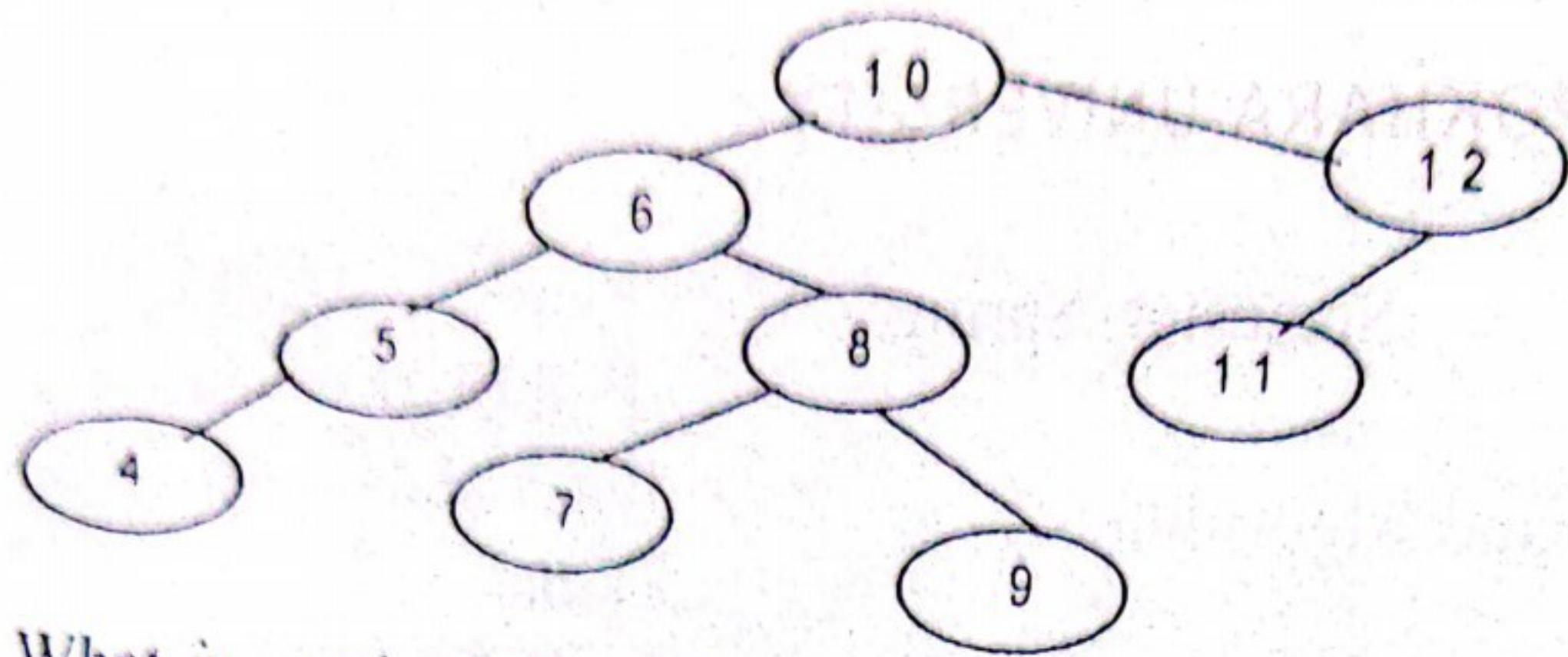
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Justify the statement "Data Structure is the backbone of software programming". What is ADT? 7
- b) Explain the basic operations of stack. Write an algorithm for insertion and deletion of an element in a stack. Also mention the condition for overflow and underflow in a stack. 8
2. a) What is infix, prefix and postfix expression? Convert the following infix expression into postfix expression showing the content of stack in each step. 7
$$P = A + ( B / C - ( D * E \$ F ) + G ) * H$$
- b) Compare circular queue with linear queue. Write enqueue and dequeue algorithm of circular queue. 8
3. a) What are the advantages and disadvantages of linear linked list? Show an algorithm to insert an element at the end and at specified position of the single linked list. 7
- b) What is doubly linked list (DLL)? How does it differ from circular linked list (CLL). Explain with appropriate example. 8
4. a) Differentiate recursion with iteration. Write down the algorithm to solve the tower of Hanoi using recursion. 7
- b) Generate the Huffman code for the symbol A, B, C, D, E, F with the probability of occurrence are 0.2, 0.28, 0.2, 0.16, 0.12, 0.04 respectively. Also construct Huffman tree. 8
5. a) Write the steps required to delete a node form a Binary Search Tree (BST). Re-construct the resulting BST after deleting the node 6 from the following BST. 7



- b) What is sorting? Explain the divide and conquer approach in quick sort algorithm. Trace the algorithm to sort the following unordered list. 40, 20, 10, 80, 60, 50, 7, 30, 100. 8
- a) Define graph. What are the difference between traversing in graph and traversing in tree? Explain with suitable example. 7
- b) 66, 47, 87, 90, 126, 140, 145, 153, 177, 285, 393, 395, 467, 566, 620, 735. From above data, store the values into hash table with 20 positions, using division method (key % table size) of hashing and the linear probing method for resolving collision. Write short notes on: (Any two) 8
- a) Spanning tree.
- b) Deque.
- c) Serial and parallel algorithm. 2×5

# POKHARA UNIVERSITY

Level: Bachelor  
programme: BE

Course: Data Structure and Algorithm

Semester: Fall

Year : 2013

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

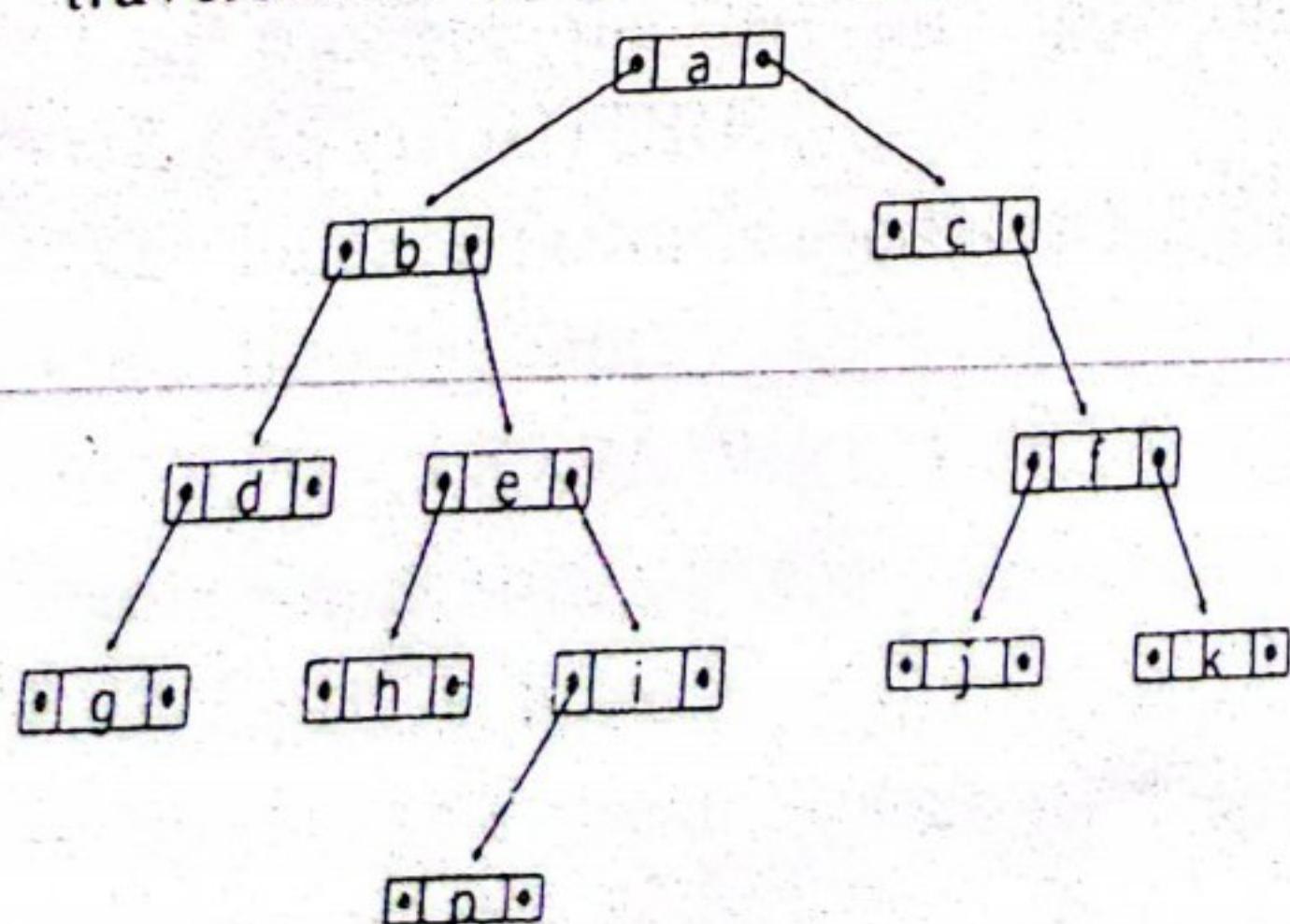
8

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) What is the difference between data type and data structure? How do you represent Rational number as an ADT? 7
  - b) Define stack as an ADT. Enlist any five applications of stack. Convert the given expression into postfix expression showing the content of stack at each step: 8
- $(A + B) \$ (C * D) - E$
2. a) Discuss the merits and demerits of contiguous list and linked list. Write algorithms to insert and delete a node in queue implemented in linked list. 8
  - b) "A function or a object calls itself". Explain this statement using idea behind it. Give recursive algorithms for Fibonacci term and TOH problem. 7
3. a) Write down C module to insert an element before, between and after node of singly linked list. 8
  - b) What is AVL Tree? Determine the pre order, in order and post order traversal for the following binary tree. 7



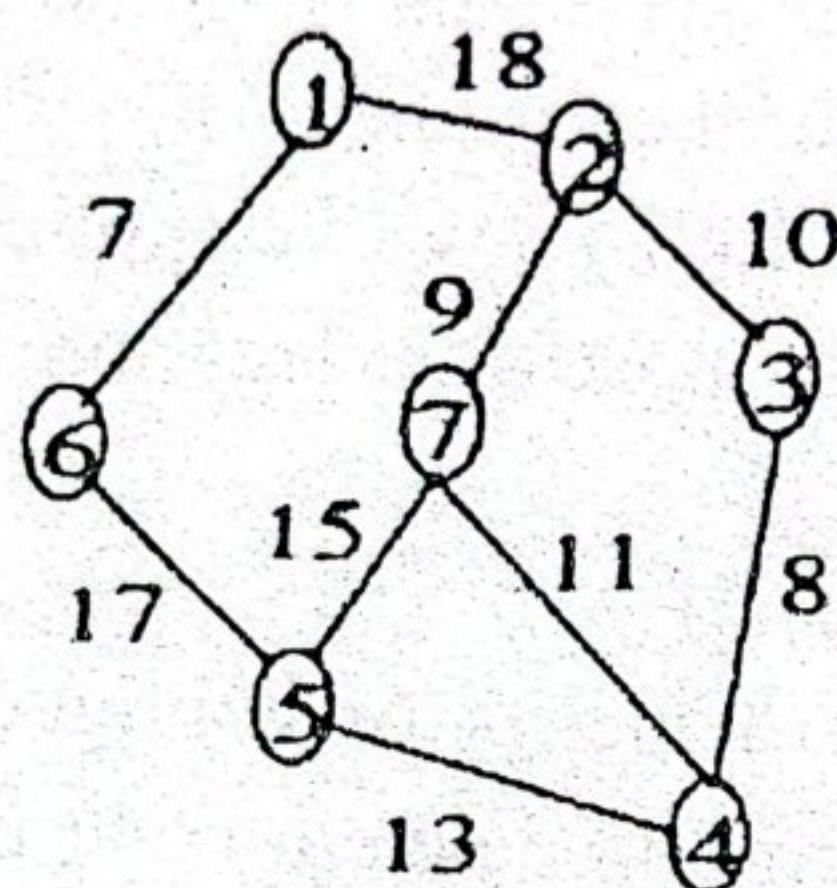
a) Why sorting is necessary and when radix sort is useful? Trace the following data using radix sort algorithm: 25, 57, 48, 37, 12, 92, 86, 33.

b) Define load factor. Given input { 1, 16, 49, 36, 25, 64, 81, 4, 9, 2 } and a hash function  $h(x) = x \bmod 10$  show the resulting:

- Hash table using quadratic probing.
- Hash table using chaining.

a) Define Big O Notation. What is parallel computing algorithm and when parallel computing algorithm is preferred over the serial one?

b) Find the Minimum Spanning Tree and its weight of the graph using Kruskal's algorithm:



a) Write Dijkstra's Algorithm to find the shortest path. Explain the algorithm with necessary figure.

b) Draw the Binary Search Tree (BST) for following string "POKHARAUNIVERSITY" considering each character as information of the node in a binary search tree. Also traverse the tree in post-order, pre-order and in-preorder.

Write short notes on: (Any two) 2×5

- Warshall's algorithm.
- Stable and unstable sorting.
- Dequeue operation using linked list.

# POKHARA UNIVERSITY

the  
86, 8  
Level: Bachelor  
programme: BE

Semester: Spring

Year : 2013  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

Course: Data Structure and Algorithm

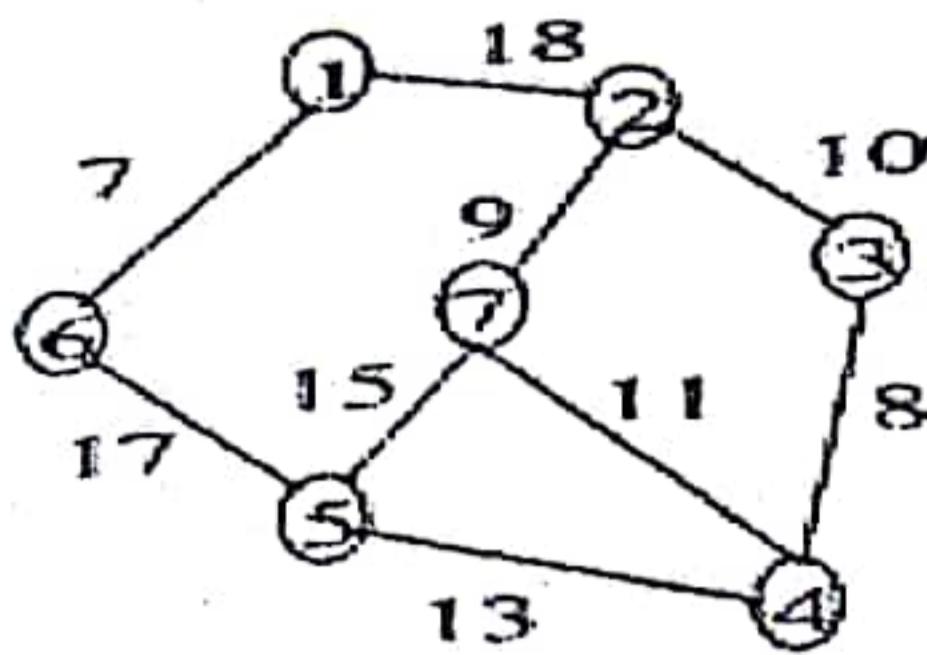
Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Attempt all the questions.**

1. a) What is data structure? Compare and contrast between primitive and non-primitive data structure. 7
- b) Define stack. Convert the given expression into prefix expression showing the content of stack at each step:  $( A + B ) * ( C \$ D ) - E / F$  8
2. a) What is a benefit of circular queue when compared to linear queue? 8
- b) What are the basic operations in a queue? Write an algorithm for any one of the operations. 8
- b) What is a linked list? Write an algorithm to insert at the beginning of the linked list. 7
- a) Why is doubly linked list used? Explain the implementation of a doubly linked list. 7
- b) Compare and contrast between recursion and iteration. Write a recursive algorithm for generating Fibonacci sequence. 8
4. a) Draw the Binary Search Tree (BST) for following string considering each character as information of the node in a binary search tree. And also traverse the tree in post-order, pre-order and in-preorder:  
**DATASTRUCTURE** 8
- b) Why balance factor is used in AVL tree? Construct an AVL tree from the following data:  
70, 80, 90, 1, 5, 89, 91, 79, 45, 21, 16, 54 8
- a) Using Radix sort, sort the given data:  
P, O, K, H, A, R, A, U, N, I, V, E, R, S, I, T, Y 7
- b) What do you mean hashing? Explain about collision resolution technique used in hashing. 7

6. a) Find the Minimum Spanning Tree and its weight of the graph using Prim's algorithm: 8



- b) Explain about deterministic and non-deterministic algorithm in brief. Also explain about Big-Oh notation with the help of suitable example. 7

7. Write short notes on: (Any Two) 2×5

- a) Greedy algorithms
- b) Bucket sort
- c) Huffman algorithm.