Tribhuvan University
Faculty of Humanities and Social Science
Semester: III
Subject: Data Structure and Algorithm
Set 1

Group B
Attempt any SIX questions. [6x5=30]

2. What is data-structure? Describe stack and queue data structure with suitable example
3. What are some examples of dynamic programming algorithms? How dynamic programming differ from greedy algorithms? Explain
4. What is stack? Why do we use stacks? What operations can be performed on stacks?
5. What is a recursive function? write down program for simulating Fibonacci series.
6. How can a singly linked list be implemented so that insertion requires no test for whether head is null?
7. Draw the expression tree a*(b+c) *(d*e+f).
8. What are the main operations of priority queue? Explain.

Group C
Attempt any TWO questions. [2 x 10 = 20]

9. Trace the algorithm to convert given infix to postfix expressions:
   a. (A + B)*(C+D/(E+F*G)-H
   b. (((*(((((A+(B+C)*D)))-E)*((F+G)*H)-I)
10. How would you remove a node from a doubly Linked list? Explain with suitable example and algorithm.
11. Write a complete menu driven program for performing various operation in array implementation of circular queue.

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Set 2

Group B

Attempt any SIX questions. [6x5=30]

2. What do you mean by all pair shortest path problem? Describe Floyd Warshall algorithm.
3. What is stable sort? List out any two stable sorting techniques with example.
4. What is queue? What are main drawbacks of linear queue over circular queue?
5. What do you mean by rotation operation in AVL tree?
6. What is stack? How it is different from queue? Show that stack and queue as ADT.
7. Draw a hash table with open addressing and a size of 9. Use the hash function "k%9".
Insert the keys: 5, 29, 20, 0, 27 and 18 into your table (in that order).
8. Mention how to insert a new node in linked list where free node will be available?

Group C

Attempt any TWO questions. [2x10=20]

2. What is use of Huffman algorithm? Explain Huffman algorithm with suitable example.
3. What is linear queue? How it is differ from priority queue? Write down algorithms for enqueue and dequeue operation for linear queue.
4. What is doubly linked list? How it is differ from singly linked list? Describe deletion of node from DLL.

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Set 3

Group B

Attempt any SIX questions. [6x5=30]

2. What do you mean by hash collision? Insert following data item into hash table of size 15 by using any one of the hash collision method.
(44, 15, 30, 45, 55, 78, 90, 115, 35, 10, 33)

3. What is heap sort? Sort following data items by using heap sort:
A[] = {3,5,6,77,32,54,1,4}

4. Write complete recursive C program for TOH problem used in recursion.

5. What is the concept behind priority queue? Write C methods for inserting and deleting elements form priority queue.

6. Sort following data items by using quick sort: A[] = {33,25,16,87,32,54,12,4}

7. Create binary search tree for following list of elements: (95, 73, 19, 98, 11, 17, 2, 70, 44, 169, 89, 409) and display the In-order, pre-order and post-order traversal of that tree.

8. What are the advantages of circular list over singly linked list? How to delete specific node from singly linked list? Explain.

Group C

Attempt any TWO questions. [2x10=20]

9. Construct expression tree of given expression A $ B + C / D * E. Convert following infix expression to their equivalent postfix expression by using stack.
A$B+C/D+E/(F+G-H/I*J)

10. What do you mean by spanning tree and minimum spanning tree? Describe Prim's algorithm for finding MST of given graph with suitable example.

11. What do you mean by divide and conquer algorithm? Write down algorithm for quick sort and trace the algorithm for following data items:
A[] = {8, 3, 4, 77, 23, 5, 7, 3, 9, 1, 19}

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Set 4

Group B

Attempt any SIX questions. [6x5=30]

2. Define Binary Tree. Write on algorithm to implement different tree traversal techniques.
3. Write an algorithm for merge sort and comment on its complexity.
4. Hasn't the following in a table of size 11. Use any two collision resolution technique.
   99 67 41 0 17 2 98 20 94 27
5. Explain Huffman Algorithm. Construct Huffman tree for "MAHARASHTRA" with its optimal code.
6. What is heuristic algorithm? How it is differ from approximation algorithm? Explain.
7. What are the application areas of priority queue? Show that priority queue act as an ADT.
8. Evaluate following postfix expressions by using stack:
   AB-CDEF/+G.*-H- Where, A = 4, B = 8, C = 2, D = 5, E = 6, F = 9, G = 1, H = B

Group C

Attempt any TWO questions. [2 x 10 = 20]

9. Write a program to implement Quick sort and show the steps to sort the following elements by Quick sort method: 19, 27, 5, 9, 86, 4, 5
10. What do you mean by postfix expression? Trace the algorithm to convert following infix expression to their equivalent postfix expression by using stack.
    A/B*(CSD+E*F) + (G*H/I)
11. What are the advantages of linked list over array? How to create node in circular linked list? Write down algorithm for inserting node to circular linked list.

Tribhuvan University
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Set 5

Group B
[6x5=30]

Attempt any SIX questions.

2. Explain the concept of priority queue with an example.
3. Illustrate the sequential search with suitable example.
4. Write a non recursive depth-first traversal algorithm.
5. Write and explain the algorithm for Tower of Hanoi.
6. What is hashing? Explain the terms hash collision.
7. Explain why the straight selection sort is more efficient than the bubble sort.
8. Explain different types of binary tree with suitable example.

Group C
[2 x 10 = 20]

Attempt any TWO questions.

9. Describe using an example, how an arithmetic expression can be represented using a binary tree. Once represented, how can the expression be output in postfix notation?
10. Define stack as an ADT. Explain the condition that is to be checked for Push and Pop operations when stack is implemented using array?
11. Explain the advantages and disadvantages of representing a group of items as an array versus a linear linked list with suitable examples.

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Set 6

Group B
[6x5=30]

Attempt any SIX questions.

2. What is main problem of linear queue over circular queue? Write down Enqueue algorithm for circular queue.
3. What are the application areas of stack? Write down TOH algorithm and also trace the algorithm for n=3.
4. What do you mean by evaluation of **postfix** expression? Trace the algorithm to evaluate following **postfix** expression by using stack. AB/C+DSEF*G/H++S
5. Define stack as an ADT. Write down PUSH and POP algorithms of stack.
6. Define BST and also show insertion and deletion process of node to binary tree with example.
7. Define representation of Graph Define Kruskal's algorithm for finding minimum spanning tree of given graph.
8. What do you mean by traversal of tree? Define DFS and BFS with suitable example.

Group C
[2x10=20]

Attempt any TWO questions.

9. How can you define heap? Sort following data items by using heap sort:

A[] = 4, 3, 22, 87, 56, 90, 11, 9A[] = 4, 3, 22, 87, 56, 90, 11, 9

10. What do you mean by linked list? Define types of linked list and write down insertion and deletion algorithms of doubly linked list.
11. How can you define internal sort and external sort? Describe quick sort and merge sort technique with suitable example.

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Set 7

Group B
[6x5=30]

Attempt any SIX questions.

2. How can you define searching? Describe sequential and binary search techniques with suitable example. Also analyze them.
3. How can you define balance factor of AVL tree? Write down insertion and deletion process of AVL tree.
4. What RAM model? Define big oh and big omega and big theta notations with suitable example.
5. How recursions differ from iterative algorithms? Define recursive algorithm for finding sum of n- natural numbers.
6. How can you define heap? Sort following data items by using heap sort:

AI=(14,93,22,87,56,90,11,90!)AI=(14,93,22,87,56,90,11,90!)

7. Define Huffman algorithm to show the compression of file with suitable example.
8. What is ADT? Describe linked list as an ADT.

Group C
[2x10=20]

Attempt any TWO questions.

9. What is graph? Define types of graph. Describe DFS and BFPS graph traversal methods with suitable examples.
10. What do you mean by linked list? Define types of linked list and write down insertion and deletion algorithms of doubly linked list.
11. How can you define internal sort and external sort? Describe quick sort and merge sort technique with suitable example.

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Set 8

Group B
[6x5=30]

Attempt any SIX questions.

2. Define stack as an ADT. Write down PUSH and POP algorithms of stack.
3. What do you mean by hash collision? Define linear probing and quadratic probing hash collision resolving techniques with suitable example.
4. Convert following infix expression to their equivalent postfix expression,

(A+B−J∗K/L)/(C∗D−ESF)∗G+H−J(*A*+*B*−*J*∗*K*/*L*)/(*C*∗*D*−*ESF*)∗*G*+*H*−*J*

5. What is main concept behind priority queue? Write down Enqueue and Dequeue algorithm of priority queue What is recursion? Define recursive algorithm for finding nth term of Fibonacci series.
6. Write an algorithm to insert a new node at the middle of doubly linked list.
7. What is dynamic memory allocation? Explain DMA with suitable example.

Group C
[2x10=20]

Attempt any TWO questions.

9. What do you mean by traversal of tree? Define BST and also show insertion and deletion process of node to binary tree with example.
10. Define representation of graph? Define Kruskal's algorithm for finding minimum spanning tree of given graph.
11. What do you mean by circular list? Define types of linked list and write down insertion and deletion algorithms of circular doubly linked list.