Exam.Code:0930
Sub. Code: 7016

1019

B.E. (Electronics and Communication Engineering)
Sixth Semester
EC-604: Data Structures and Algorithms

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

Q1. (i) Define an Algorithm. List the steps involved in the development of an algorithm.
(ii) How do circular queues help overcome the disadvantages of linear queues?
(iii) What do you understand by the term 'Garbage Collection'?
(iv) If a stack S[1: n] were to be implemented with the bottom of the stack as S[[n]; write a procedure to undertake 'Push' operation on S.
(v) What is the max. and min. number of elements a 100-way search tree of height 3 can hold?

Part-A

Q2. (a) For the following array, B compute the following: (i) dimension of B
(ii) space occupied by B in the memory and (iii) address of B[7,2]

(b) Two algorithms A and B report time complexities expressed by the functions n^2 and 2^n respectively. They are to be executed on a machine, M which consumes 10^{-6} seconds to execute an instruction. What is the time taken by the algorithms to complete their execution on machine, A for an input size of 50? If another machine, N which is 10 times faster than machine, M is offered for the execution; what is the largest input size that can be handled by the two algorithms on machine, N? Give the observations.

Q3. (a) Write an algorithm to convert the following infix expression to prefix expression.
(A * B - F * H) ↑ D, for A = 2, B = 1, D = 2, F = 4 and H = 3.

(b) What do you understand by the term 'Priority Queue'? Explain in detail the various methods of implementing a priority queue and discuss their time complexities.

Q4. (a) Consider COLOURS [0 : 3] be a Circular Queue data structure. Perform the operation of inserting following colors: Orange, Blue, White, Yellow and Red colors into the queue.

(b) Write a recursive program to obtain the n^{th} order Fibonacci sequence number. Include the appropriate input / output statements to track the variables participating in recursion. Is there any 'invisible' stack at work? Record the observations.

Part-B

Q5. (a) A binary tree T has 9 nodes. The inorder and preorder traversals of T yield the following:

Inorder traversal (I):	E	A	C	K	F	H	D	B	G
Preorder traversal (P):	F	A	E	K	C	D	H	G	B

Draw the binary tree T.

(b) Write a recursive procedure to count the number of nodes in a binary tree.

Q6. (a) Write a procedure to explain the process of Depth First Traversal of an undirected graph.

(b) Write a short note on AVL Trees.

Q7. (a) For a graph of your choice, trace its adjacency matrix and adjacency list representations.

(b) Perform Radix Sort for the following list: L = {001, 101, 010, 000, 111, 110, 011, 100}.

x-x-x