MODEL QUESTION PAPER

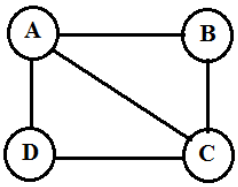
DIPLOMA IN COMPUTER ENGINEERING

Data Structures

Time : 3 Hour ***Max.Marks : 75***

PART A

I. Answer **all** questions in one word or one sentence. (9 x 1 = 9 Marks)

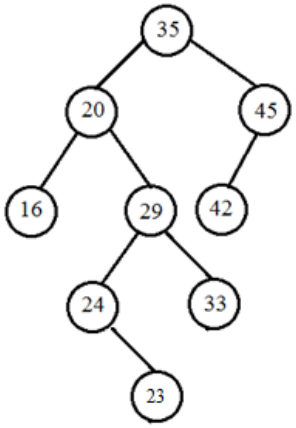
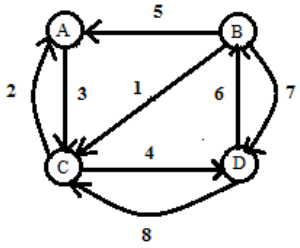
1.	Consider a circular queue of size 'N'. If 'rear' is an index of the last element, what will be the index for the element after rear?	M 1.05	R
2.	The ---------- operation removes an item from the top of the stack.	M 1.02	R
3.	Write the postfix notation for the infix expression (A * (B + C) / D).	M 1.03	A
4.	Write the structure of a node in a singly linked list.	M 2.01	R
5.	When the link of the last node in a singly linked list is made to point the first node, it becomes a ----------	M 2.03	R
6.	How many leaf nodes would be present in a N-level full binary tree?	M 3.02	R
7.	In an expression tree, how are the operands and operators represented?	M 3.05	U
8.	A graph (or digraph) is termed as ---------- if all the edges in it are labelled with some weights.	M 4.01	R
9.	Write the set representation of the graph shown in Figure 1.  **Figure 1**	M 4.03	U

PART B

II. Answer any **eight** questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

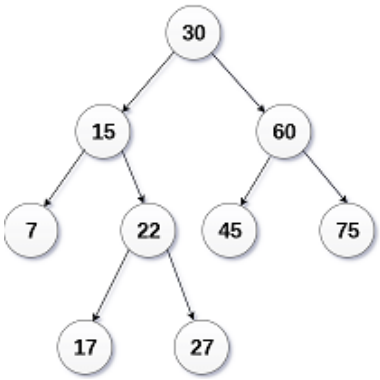
1.	Write an algorithm to insert an element into and delete an element from a stack using array.	M 1.02	A
2.	How is a circular queue better than a linear queue?	M 1.05	U
3.	Explain about the different ways to implement a priority queue.	M 1.05	R
4.	Consider an empty linked list. Perform the following operations and write the output for each operation. a) InsertFront(60) b) InsertRear(30) c) DeleteFront( ) d) InsertRear(50) e) InsertFront(10) f) DeleteRear( )	M 2.02	U

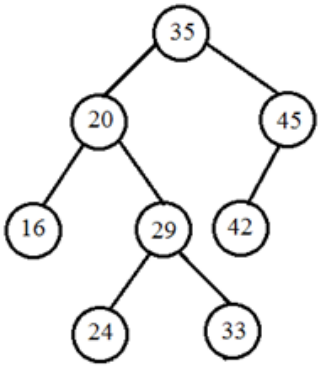
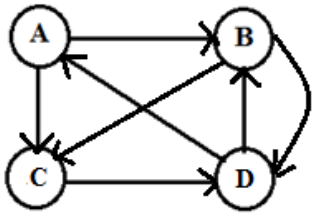
5.	Do we have underflow and overflow situation in a linked stack? Justify your answer.	M 2.04	U
6.	Write an algorithm to insert an item at a given position *'n'* in a linked list.	M 2.02	U
7.	Is the following binary tree a binary search tree? Justify your answer.  **Figure 2**	M 3.04	U
8.	Write a recursive procedure to find the height of a binary search tree.	M 3.04	U
9.	Write the Linked representation of the following graph.  **Figure 3**	M 4.03	U
10.	Differentiate between depth-first search and breadth-first search traversal of a graph.	M 4.04	U

PART C

Answer **all** questions. Each question carries 7 marks. (6 x 7 = 42 Marks)

III.	Consider the two operations of the stack as push(item) and pop() to insert an item into and delete an item from a stack respectively. Draw the stack structure and write the appropriate operations in case when the following operations are performed on an empty stack. a) Add A,B,C,D,E,F b) Delete two alphabets c) Add G d) Add H e) Delete three alphabets f) Add I,J,K g) Delete one alphabet **OR**	M 1.02	U

IV.	Consider the queue given below which has FRONT=1 and REAR=5 0 1 2 3 4 5 6 7 8 9 | | A | B | C | D | E | | | | | Perform the following operations on the queue and draw the queue structure after each operation where Enqueue(item) is for insertion and Dequeue() is for deletion of items. a) Enqueue(F) b) Dequeue(), Dequeue() c) Enqueue(G) d) Enqueue(H) e) Dequeue(), Dequeue(), Dequeue() f) Enqueue(I) g) Enqueue(J)	M 1.04	U
V.	Write an algorithm to convert infix expressions like "a * b" into its corresponding postfix expression like "a b *". **OR**	M 1.03	A
VI.	Write an algorithm to reverse a given integer using a suitable data structure.	M 1.04	A
VII.	Given a singly linked list containing integer type of data. Suppose X and Y are two nodes in the list, write an algorithm to add all the nodes between X and Y (both are inclusive). **OR**	M 2.02	A
VIII.	Write an algorithm by implementing a data structure using singly linked list to reverse a given string.	M 2.04	A
IX.	Compare the result of inorder, preorder and postorder traversals of the following binary search tree.  **Figure 4** OR	M 3.04	U

X.	Write an algorithm to delete a node which contains data 20 in the following binary search tree (Figure 5)  **Figure 5**	M 3.04	U
XI.	Why threaded binary trees are called efficient binary trees? Give the merits of using a threaded binary tree. **OR**	M 3.04	U
XII.	Construct an expression tree for the infix expression (A + B * C) – ((D * E + F) / G).	M 3.04	U
XIII.	Explain the algorithm to perform breadth-first search traversal in a graph with an example. **OR**	M 4.04	U
XIV.	Consider the following graph. Construct its adjacency matrix A and calculate the path matrix P using the Warshall's algorithm.  **Figure 6**	M 4.05	U

Mark Distribution

Module	hr /Module	Marks / Module (hi /ΣHi) * 123 (±5%)	Type of Questions							
			Part A		Part B		Part C		Total	
			No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks
1	18	38	3	3	3	9	4	28	10	40
2	12	26	2	2	3	9	2	14	7	25
3	16	33	2	2	2	6	4	28	8	36
4	12	26	2	2	2	6	2	14	6	22
Total	58	123	9	9	10	30	12	84	31	123

Cognitive Level Mark Distribution

Cognitive Level	Marks	% of Marks
Remembering	9	7
Understanding	82	67
Applying	32	26
Analysing		
Evaluating		
Creating		
Total	123	100