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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS –JANUARY 2016

Course & Branch	**: B.E.- Information Science & Engg.**	**Semester**	**: III**
Subject	**: Data Structures**	**Max. Marks**	**: 100**
Subject Code	**: IS333**	**Duration**	**: 3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

1.	a)	Define stack. List and implement the basic operations on stack.	CO1	(10)
	b)	Design a C code to convert an the expression from infix to postfix form using stack.	CO1	(10)
2	a)	What is a postfix notation? Bring out the importance of postfix notation in computer and convert the following from infix to postfix form using stack. i. ((A+B)*C-(D-E))$(F+G) ii. A-B/(C*D$E) iii. A$B*C-D+E/F/(G+H)	CO1	(10)
	b)	Design an algorithm to evaluate a postfix expression using stack and evaluate the expression 623+-382/+*2^3+ using the same.	CO1	(10)

UNIT-II

3.	a)	Define recursion. Write a recursive function for computing nth term of a Fibonacci sequence. Hence give the trace of stack contents for n=5.	CO2	(10)
	b)	What are priority queues? Design a C code to implement priority queues insertion operation using arrays.	CO2	(06)
	c)	What are the major drawbacks of ordinary queues? How do you overcome them.	CO2	(04)
4.	a)	What are double ended queues? Design C functions to implement basic operations on double ended queues.	CO2	(14)
	b)	Explain the working principle of circular queue with neat diagrams.	CO2	(06)

UNIT - III

5.	a)	What is dynamic memory allocation? Explain malloc() and free() functions with an example for each.	CO3	(06)
	b)	How can an ordinary queue be represented using a singly linked list? Design C routines for linked implementation of ordinary queue operations, insertion and deletion.	CO3	(10)
	c)	Design a C code to reverse a Doubly Linked List	CO3	(04)
6.	a)	What is a doubly linked list(DLL)? Write the C representation of the following i. Insert an element into a DLL ii. Delete an element from a DLL iii. Display the contents of the DLL	CO3	(10)

b) Design a C routine for CO3 (10)
   i. To reverse the direction of singly linked list.
   ii. To count the number of nodes in a singly linked list.
   iii. To create ordered list.

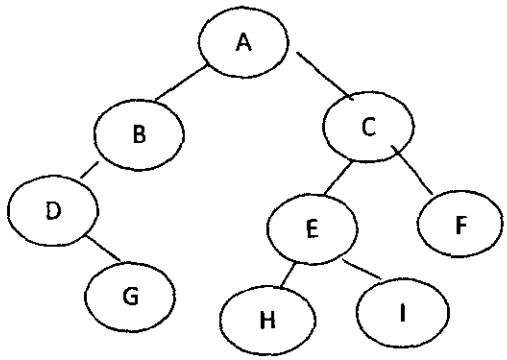
UNIT-IV

7. a) Write short note on: CO4 (10)
   i. Header linked list and its types.
   ii. Header node implementation and its Usage.
   b) Design a C code to implement stacks using circular linked list. CO4 (10)

8. a) Write a short note on circular lists. CO4 (05)
   b) Design a C routine to check for palindrome using doubly linked list. CO4 (05)
   c) Pictorially demonstrate the following on circular linked list: CO4 (10)
   i. Inserting a newnode at position=4.
   ii. Deleting a last node from the list.

UNIT-V

9. a) What is a binary tree? Discuss types of binary trees with an example for each. CO5 (10)
   b) Enumerate three types of tree traversal recursively for the following binary tree. CO5 (10)



10. a) Given a list of integers, write an algorithm to construct a binary search tree avoiding duplicate integers. Trace the algorithm to construct binary search tree for the list: 6 4 3 7 10 14 3 7 5 CO5 (10)
   b) Define Huffman code. Construct Huffman tree and generate Huffman codes given the symbols and their frequency of occurrences. CO5 (10)

Symbol	Frequency
A	15
B	6
C	7
D	12
E	25
F	4
G	6
H	1
I	15

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