RAMAIAH
INSTITUTE OF
TECHNOLOGY

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(Autonomous Institute, Affiliated to VTU)
Bangalore – 560 054

SEMESTER END EXAMINATIONS – JANUARY 2017

Course & Branch	**:**	**B.E.–Information Science & Engineering**	**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)	With the help of precedence tables and conversion tables show the detailed steps of converting following infix expression to postfix expression from using stack: ((A + B) * C – (D – E)) $ ((F + G) * H)	CO1	(10)
	b)	Write a C Program using structures to perform arithmetic operations on complex numbers.	CO1	(10)
2.	a)	Write a C program to show various operations performed on stacks.	CO1	(10)
	b)	What is recursion? Write a program to solve Tower of Hanoi Problem using recursion and trace the same program for 4 discs.	CO1	(10)

UNIT – II

3.	a)	Develop a C program to implement linear queue.	CO2	(10)
	b)	Consider an empty Circular Queue (CQ) of size 4 (array indices 0 to j). Illustrate the following operations in sequence on CQ i) 4 insertions ii) 1 deletion iii) 2 insertions iv) 2 deletions.	CO2	(05)
	c)	Explain descending priority queue with an example.	CO2	(05)
4.	a)	Illustrate with an example the limitation of linear queue.	CO2	(04)
	b)	Develop a C program to implement circular queue.	CO2	(10)
	c)	Develop C functions to perform insertion and deletion operations on ascending priority queue.	CO2	(06)

UNIT – III

5.	a)	Write a C function to insert elements from front to two lists and merge two lists to form an ordered list.	CO3	(10)
	b)	Write a C program to implement insert and delete elements from rear on a doubly linked list along with display function.	CO3	(10)
6.	a)	What are linked lists? How are they advantageous over Stacks, and Queues? Write a note on dynamic memory allocation and de-allocation	CO3	(10)
	b)	Write a C code to implement Circular Linked List insert and deletion of the elements at a desired position along with its display function.	CO3	(10)

UNIT – IV

7.	a)	Show how linear queue can be implemented using singly linked list by writing C functions for insertion and deletion operations.	CO4	(08)
	b)	Develop C function to implement preorder traversal on a binary tree.	CO4	(05)
	c)	Define binary search tree. Develop a C function to display the number of leaf nodes in a given binary search tree.	CO4	(07)
8.	a)	Define with examples strictly binary tree, complete binary tree and almost complete binary tree.	CO4	(06)
	b)	Construct the binary tree for the list 8 12 10 7 6 3 4 2. And traverse it using post order traversal.	CO4	(05)
	c)	Develop a C function to delete a node which has two children in a binary search tree.	CO4	(09)

UNIT – V

9.	a)	Discuss brief history of file structure design.	CO5	(10)
	b)	Bring out any two differences between B-tree and B+ tree. Construct a B-tree of order 4 for the following set of input data: C, S, D, T, A, M, P, I, B, W, N, G, U, R, K, E, H, O, L, J, Y, Q, Z, F, X, V	CO5	(10)
10.	a)	Write a short note on "Chained Progressive Overflow".	CO5	(06)
	b)	What is collision? Explain the Simple Hashing Algorithm.	CO5	(06)
	c)	Assuming that 1000 addresses are allocated to hold 1000 records in a randomly hashed file and that each address can hold one record. i. Assuming poisson function, determine how many addresses will have no records assigned to them? ii. How many will have one, two, three up to six records assigned to them? iii. Expected number of overflow records?	CO5	(08)

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IS33

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SEMESTER END EXAMINATIONS – JANUARY 2018

Course & Branch	**:**	**B.E.: Information Science & Engineering**	**Semester**	**:**	**III**
Subject	**:**	**Data Structures**	**Max. Marks**	**:**	**100**
Subject Code	**:**	**IS33**	**Duration**	**:**	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1.	a)	Define a structure. Write appropriate structure definition and variable declarations to store following information about 20 students: Name, USN, Gender, Date of birth and marks in three subjects S1, S2 and S3. Date of birth should be a structure containing fields day, month and year.	CO1	(06)
	b)	Define stack. Briefly explain the primitives operations on stack.	CO1	(08)
	c)	Show using tabular columns, convert the expression (A+B)*(C-D/E)$F into a postfix expression using stack.	CO1	(06)
2.	a)	State how recursion is different from iteration?	CO1	(04)
	b)	What is a stack? Explain overheads caused by stack in recursion with a suitable example.	CO1	(08)
	c)	Write the algorithm for evaluating a postfix expression using stack. Evaluate the following postfix notation 5 6 2 + * 8 4 / - .	CO1	(08)

UNIT- II

3.	a)	Show how a sequence of insertions and removals from a queue represented by a linear array can cause overflow to occur upon an attempt to insert into an empty queue.	CO2	(05)
	b)	Demonstrate the drawbacks of linear queue with suitable pictorial representation. How do you overcome these?	CO2	(05)
	c)	Design a program to sort a set of input numbers using a priority queue and write the functions to perform the operations *pqinsert*, *pqmindelete* and *empty*.	CO2	(10)
4.	a)	Design the code to perform the basic operations on circular queue.	CO2	(10)
	b)	What is priority queue? Explain the different methods of implementing priroity queue and comment on the efficiency of each method.	CO2	(10)

UNIT- III

5.	a)	Design a C-code to to perform the following on Circular linked list: i. Insert a node at last position ii. Delete a node at last position	CO3	(10)
	b)	Design a C/C++code to delete duplicates in a linked list.	CO3	(10)

6.	a)	Design a C-code to to perform the following on Singly linked list: i. Insert a node at certain position ii. Delete a node at first position	CO3	(10)
	b)	Discuss the importance of Header nodes in a linked list.	CO3	(05)
	c)	Bring out the similarities and differences between circular and doubly linked list.	CO3	(05)

UNIT- IV

7.	a)	Develop a C program to implement stack using SLL.	CO4	(10)
	b)	Define binary search tree. Construct a binary tree for the list 8 12 10 7 6 3 4 2. And traverse it using all traversal techniques.	CO4	(10)
8.	a)	Define the following terms with examples: root of tree, level of node, strictly binary tree, complete binary tree and binary search tree.	CO4	(10)
	b)	Develop C function to implement the following on BST: i) Number of children the given node has. ii) Leftmost child ofgiven node. iii) Delete a node which has no children.	CO4	(10)

UNIT – V

9.	a)	What are B+ trees? Explain. Develop a C function to search for a node in a B+Tree.	CO5	(10)
	b)	Define hashing. Discuss hashing with chained progressive overflow with diagrams.	CO5	(10)
10.	a)	Define B-Tree. Explain with an example the creation of B-Tree.	CO5	(10)
	b)	What is collision? Explain the different ways of reducing the number of collisions in hashing.	CO5	(10)

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SEMESTER END EXAMINATIONS – JANUARY 2019

Course & Branch	**:**	**B.E. : Information Science and Engg,**	**Semester**	**:**	**III**
Subject	**:**	**Data Structures**	**Max. Marks**	**:**	**100**
Subject Code	**:**	**IS33**	**Duration**	**:**	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1.	a)	Define a student structure with University Seat Number (USN), name (FirstName, LastName), and marks in 3 subjects as members of that structure with nesting. Write a C program to read the information for one student and print the same.	CO1	(04)
	b)	Write a C program to with respect to stack implement the following operations: i)push ii)pop iii)display.	CO1	(08)
	c)	Convert the following infix expressions to postfix expression: (a+b)*d+e/(f+a*d)+c. Show stack contents .	CO1	(08)
2.	a)	Write a C function to evaluate postfix expression. Evaluate the following expression: 6 2 / 3 – 4 2 * +. Show stack contents.	CO1	(08)
	b)	Write recursive definition for generating Fibonacci Sequence. Write a C function to compute the nth Fibonacci number.	CO1	(06)

	c)	Determine what the following recursive C function computes. Write an iterative function to accomplish the same purpose.
		intfunc(int n)
		
		{
		If (n==0)
		return 0;
		return(n + func(n-1));
		}
			CO1	(06)

UNIT- II

3.	a)	Design a function in C for Insertion and Deletion operations with respect to Circular queue.	CO2	(10)
	b)	Define the terms/functions: Front end of queue, Rear end of queue, qfull() and qempty().	CO2	(04)
	c)	What do you understand by the terms Overflow and Underflow of queue? Consider a circular queue of maximum size as 4 and perform the following operations by showing the contents diagrammatically: i. Insert 4 elements ii. Remove 2 elements iii. Insert 1 element iv. Remove 3 elements.	CO2	(06)
4.	a)	What are double ended queues? Design C routine to implement the following operations on double ended queues. i. Insertion at the front ii. Deletion at the rear.	CO2	(06)

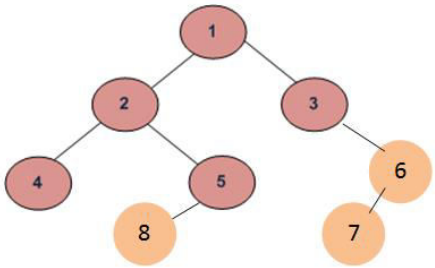
	b)	What is a priority queue and explain the various types of priority queues? Design a function to implement ascending priority queue in C/C++.	CO2	(10)
	c)	Discuss malloc() function stating its syntax and return values.	CO2	(04)

UNIT- III

5.	a)	Write a C routine for singly linked list: i) To find the smallest element ii) To insert at specified location.	CO3	(10)
	b)	What do you understand by the term circular linked list and write a C program to insert at the beginning and display the list.	CO3	(10)
6.	a)	Write C routines for the following for a doubly linked list. i) Inserting an item at the beginning ii) Display the list of items only if the item is an even number.	CO3	(10)
	b)	Compare and contrast Singly, circular and doubly linked list.	CO3	(10)

UNIT- IV

7.	a)	Write C-code for Inorder, Preorder and Postorder binary tree traversals. Write the results of traversal for the below binary tree using above algorithms.	CO4	(08)



	b)	Define the following with one example for each: i) Degree ii) Path iii) Strictly Binary Tree iv) Level of a node v) Height of a tree.	CO4	(12)
8.	a)	Give the non-recursive code for inorder traversal of a binary tree.	CO4	(08)
	b)	Write any two differences between Trees and Binary trees.	CO4	(04)
	c)	What is the difference between a Binary Tree and a Binary Search Tree? Illustrate the Binary Search Tree created out of the following elements: 38,13,51, 10,12,40, 84,25,89, 37,66,95. Explain the logic used to create your illustration.	CO4	(08)

UNIT- V

9.	a)	What are File Structures? Differentiate between physical files and logical files.	CO5	(06)
	b)	What are B-Trees? Explain in detail an object oriented representation of B-tree.	CO5	(06)
	c)	Describe collision resolution by progressive overflow.	CO5	(08)
10.	a)	Discuss the brief history of file structure design.	CO5	(06)
	b)	Compare and contrast B tree and B+ tree.	CO5	(06)
	c)	Discuss any two methods to avoid collision in hashing techniques.	CO5	(08)

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IS35/IS33(O)

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SEMESTER END EXAMINATIONS – JANUARY 2020

Program	:	**B.E.: Information Science and Engineering**	**Semester**	:	**III**
Course Name	:	**Data Structures**	**Max. Marks**	:	**100**
Course Code	:	**IS35 /IS33(O)**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1.	a)	Write a C function to simulate towers of Hanoi problem for N discs. Show the trace for N=3.	CO1	(08)
	b)	What is a queue? What are the different types of queues? Give any two applications of queue data structure.	CO2	(06)
	c)	Compare physical files and logical files.	CO1	(06)
2.	a)	Compare linear data structures and non linear data structures.	CO4	(06)
	b)	Define recursion and design a code snippet to compute x to the power of y where x and y are integers and y is positive, Using the same show the trace for x=5 and y=4.	CO1	(08)
	c)	What is a file structure? What is its significance?	CO2	(06)

UNIT- II

3.	a)	Write a C routine for singly linked list: i) To find the smallest element ii) To split a list into two equal Lists. (If the number of nodes are odd, List1 will have one node more than List2)	CO2	(12)
	b)	Explain the concept of circular linked list and write a C program to implement search function in a circular linked list.	CO2	(08)
4.	a)	Write C routines for the following with respect to doubly linked list: i) Deleting a particular item. ii) Insert a node into an ordered doubly linked list.	CO2	(10)
	b)	Write a program in C to insert a new node at the middle of Singly Linked List.	CO2	(10)

UNIT- III

5.	a)	Given expression : **((A+(B-C)*D)^D)^E+F**, perform the following: i) Convert this into Postfix notation ii) Explain why infix to postfix conversion is required iii) Write a 'C' program to implement this infix to postfix conversion	CO3	(10)
	b)	Read the following statement and state which data structure you would use to implement it: "Suppose we are finding a path for solving maze problem. We choose a path and after following it we realize that it is wrong. Now we need to go back to the beginning of the path to start with new path." Write a 'C' program to implement the basic operations of this data structure.	CO3	(10)

6.	a)	What are the limitations of a Linear Queue? How do you think a Circular Queue will help overcome these limitations? Illustrate with examples.	CO3	(08)
	b)	Assume that you are a buffet manager monitoring a queue of people standing to get the plate and have a buffet lunch. Five elderly people of different ages walk in towards you. You will request five younger people near the front of the queue to give up their position so that the elder people can get their lunch ahead of these people. Which data structure in the computer world mimics this real-life scenario? Justify your answer. Write a 'C' program to implement this data structure.	CO3	(12)

UNIT- IV

7.	a)	How can an ordinary queue be represented using singly linked list? Write routines for linked implementation of ordinary queue insertion and deletion.	CO4	(10)
	b)	Discuss how binary trees are represented using lists.	CO4	(05)
	c)	Discuss the various ways in which binary trees can be represented in the memory of a computer.	CO4	(05)
8.	a)	How can a stack be represented using singly linked list? Write routines for linked implementation of push and pop operations of stack.	CO4	(10)
	b)	Define Binary Search tree. Write an algorithm to construct binary search tree for the input 14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 15 indicating message for duplicate numbers. Draw the tree constructed using the above algorithm.	CO4	(10)

UNIT- V

9.	a)	Explain the basic differences between B-Tree and B+Tree. Why are B+ Tree advantageous over B Tree?	CO5	(10)
	b)	Define Collision. Discuss any two collision resolution techniques.	CO5	(10)
10.	a)	Define hashing. Why do we need it? Discuss any three techniques of hashing for the input (371, 323,173,199,344,679,989).	CO5	(10)
	b)	Construct a B- tree of order 3 with the following elements. 25,10,20,30,80,40,50,60,82,70,90,85,93.	CO5	(10)

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SEMESTER END EXAMINATIONS FEBRUARY - MARCH 2021

Program	:	**B.E.: Information Science and Engineering**	**Semester**	:	**III**
Course Name	:	**Data Structures**	**Max. Marks**	:	**100**
Course Code	:	**IS35**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit

UNIT- I

1.	a)	Discuss briefly the history of file structure design.	CO1	(10)
	b)	Compare Data structures and File structures.	CO1	(05)
	c)	With an example, show that the factorial of a number can be computed using recursion.	CO1	(05)
2.	a)	Differentiate between physical files and logical files.	CO1	(05)
	b)	Define Recursion. Design a recursive program to solve the towers of Hanoi problem using C/C++. Give the trace for 3 discs.	CO1	(10)
	c)	What are the different ways of initializing one and two dimensional arrays?	CO1	(05)

UNIT – II

3.	a)	Discuss the doubly linked lists with advantages and disadvantages. Write a C function to delete a node from a circular doubly linked list with header node.	CO2	(10)
	b)	What is a linked list? Illustrate the different types of linked lists with neat diagram.	CO2	(10)
4.	a)	What is circular linked list? Write a C program to implement search function and delete a node given its position in a circular linked list.	CO2	(10)
	b)	Implement the following using singly linked list: i) Count the number of nodes in the list ii) Reverse the list.	CO2	(10)

UNIT – III

5.	a)	Define stack. List and implement basic operations on stack.	CO3	(10)
	b)	What are priority queues? Design a C code to implement priority queues insertion operation using arrays.	CO3	(06)
	c)	What are the major drawbacks of ordinary queues? How do you overcome them?	CO3	(04)
6.	a)	Design a C code to convert an expression from infix to postfix form using stack.	CO3	(08)
	b)	Explain the working principle of circular queue with neat diagrams.	CO3	(05)
	c)	Design an algorithm to evaluate a postfix expression using stack and evaluate the expression 623+-382/+*2^3+ using the same.	CO3	(07)

UNIT – IV

7.	a)	Write a program that implements a queue using linked lists. Test the program with five integers.	CO4	(08)
	b)	Discuss how binary trees are represented using lists. Mention the drawbacks of representing binary trees using arrays.	CO4	(08)
	c)	Justify how linked lists are better than array data structures.	CO4	(04)
8.	a)	Write an algorithm to perform recursive search and iterative search for a given element in a Binary Search Tree.	CO4	(10)
	b)	Write routine for i. create a binary tree ii. In order tree traversal of a Binary Tree.	CO4	(10)

UNIT – V

9.	a)	Give any two points each to compare and contrast B-Trees and B+ Trees. With any example values of your choice illustrate and explain the step-by-step logic used for the following: i. Creation of a B+ Tree out of those values i. Inserting a new value into the B+ Tree.	CO5	(12)
	b)	What is Hashing? Why do you need it? Explain a Simple Hashing function algorithm.	CO5	(08)
10.	a)	Define B-Tree. Explain with an example the algorithm for inserting an element into this B-Tree.	CO5	(10)
	b)	What is 'Collision'? Explain *any two* Collision Handling techniques.	CO5	(10)

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