END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-2010

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Paper Code: BCA 108	**Subject: Data Structure Using C**
Paper ID: 20108	
Time : 3 Hours	**Maximum Marks : 75**

Note: Question 1 is compulsory. Internal choice is indicated.

Q1.
- (a) What is sparse matrix? Implement sparse matrix as an array.
- (b) What are the applications for the tree data structure?
- (c) Which data structure is used to perform recursion? Explain.
- (d) Convert the expression given below into its equivalent prefix and postfix notation.

$$((A+B)^\wedge C - (D-E)^\wedge (F+G))$$

- (e) How many branches are there in a binary tree with 20 nodes?
- (f) What pointer type is used to implement the heterogenous linked list in C?
- (g) Differentiate between linear search and binary search.
- (h) Write a function in C that counts the total number of nodes in a binary tree.
- (i) What do you understand by multi level indexing? State its application.
- (j) Traverse the given tree (below) using In-order, Pre-order and Post-order traversals. **(10x2.5=25)**
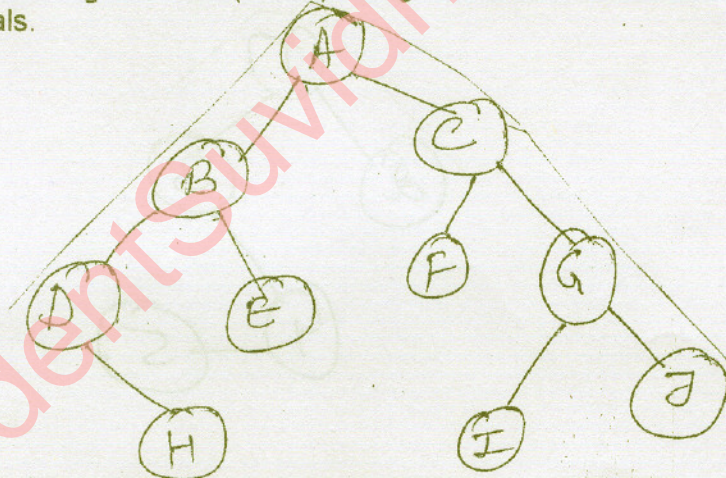
Q2. What are the advantages of circular queue over queue? Write a menu driven program to implement simple arithmetic operations in circular queue. **(12.5)**

OR

- (a) Why an operation to check 'stack overflow' is not implemented on linked stack? Explain. **(4)**
- (b) What is stack? Is stack a linear or non linear data structure? **(4)**
- (c) What are D-queues? Explain with the help of an example. **(4.5)**

Q3.
- (a) Differentiate between linked list and an array. **(3.5)**
- (b) Write a function in C to add a node 'before' a node and count the number of nodes in doubly linked list. **(5+4=9)**

OR

- (a) What do you mean by complete binary tree? Draw one such tree. **(3)**
- (b) How an AVL tree differ from binary search tree? Also explain how AVL trees are represented in memory. **(4)**
- (c) Write an algorithm for insertion of a node in binary search tree using linked list representation. **(5.5)**

P.T.O.

Q4. (a) Define B-tree. Draw a B tree of order 5 when the following keys arrive in following order C N G A H E K Q M F W L T Z D P R X Y S. **(10)**

(b) What is the advantage of using B tree for indexing? **(2.5)**

OR

(a) A binary tree, T has 9 nodes. The Pre-order and In-order traversal of T yields the following sequence of nodes. **(6.5)**

Pre-order: F A E K C D H G B

In-order : E A C K F H D B G

Draw the binary tree T.

(b) How many null branches are there in binary tree with 20 nodes? **(2)**

(c) In the given binary tree, using array you can store the node 4 at which location ? **(4)**
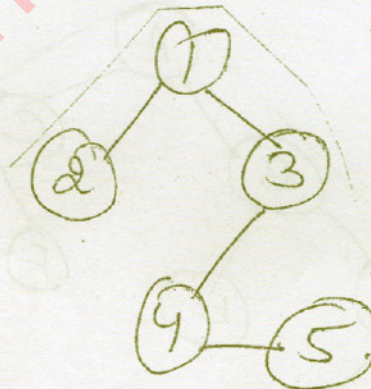
Q5. What do you understand by hashing? State the different types of hashing techniques? What are the limitations in each technique and how to overcome them? **(12.5)**

OR

(a) Write a C program that implement selection sort. **(6.5)**

(b) Sort the following numbers (showing each iteration) using insertion sort. **(6)**

57, 73, 43, 77, 83, 63, 87.

END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-2008

Paper Code: BCA108	Subject: Data Structure Through C++
Paper Id: 20108	(Batch: 2001-2004)
Time : 3 Hours	Maximum Marks :75

Note: Attempt any five questions.

Q1 (a) Give sequential representation of sparse matrix. Also write an algorithm to add two sparse matrices using this representation scheme. **(7.5)**

(b) Write some common applications of stack. Using the concept of stack write an algorithm to convert infix expression into polish postfix form. **(7.5)**

Q2 (a) Write an algorithm to insert an element in a circular queue. What is the practical use of a circular queue? **(7.5)**

(b) Given a link list 'L', write a procedure that removes first element of this list and appends it at the last. **(7.5)**

Q3 (a) A binary tree has 09 nodes. The in-order and pre-order traversal of the tree yield the following sequences.

In-order	5	1	3	11	6	8	4	2	7
Pre-order	6	1	5	11	3	4	8	7	2

Giving full justification, find out the binary tree. **(7.5)**

(b) Draw all possible binary trees that have four terminal nodes and all the non-terminal nodes have two children. Also, give post-order traversal of any one of such binary tree. **(7.5)**

Q4 (a) What are various file organization techniques? Discuss and compare Inverted and Index-sequential file organizations in details. **(7.5)**

(b) Write down Quicksort algorithm. Trace your algorithm on the following data:- 20, 11, 55, 28, 9, 35, 40. **(7.5)**

Q5 (a) In the B-tree of order m=3 given below, delete the record with key N. Illustrate evolution of the tree as the B-tree deletion algorithm proceeds:- **(7.5)**
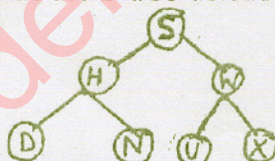
(b) Construct a B-tree of order m=3 by inserting the following keys into an initially empty tree. A, B, C, D, E, F, G, H. Show the tree at each step. Can a tree of lower height, also m=3 and containing the same keys be constructed? If so, show such a tree and if not, explain the reason. **(7.5)**

Q6 (a) Differentiate between internal and external sorting techniques. Give the basic underlying method used in external sorting. **(7.5)**

(b) Draw a binary search tree whose elements are inserted in the following order:- 50,72,96,94,107,26,12,11,9,2. Delete the element 2 from the binary search tree so constructed. Give all steps. **(7.5)**

Q7 Write short notes on **any three** of the following:- **(3x5=15)**

(a) Abstract data models for file access

(b) Multi level indexing

(c) Circular Queues

(d) Object-oriented model for co-sequential processes.

(e) Multiway merzing.

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END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-2008

Paper Code:BCA-108	Subject: Data Structures using C
Paper Id: 20108	(Batch: 2005-2007)
Time : 3 Hours	Maximum Marks :75

Note: Q1. is compulsory. Attempt one question from each unit.

Q1. (a) Show the memory representation of 2-D arrays with an example. (2)

(b) What are D-queues? Explain. (3)

(c) Define Complete Binary Tree, Full Binary Tree, Degree of a Tree, Height of a Tree and Ancestors of a node. Take an example to explain. (5)

(d) Give the Binary Tree representation of the following expression: (3)

$E = (a-b) / ((c * d)+e)$

(e) Define a B-Tree. (2)

UNIT-I

Q2. (a) What are sparce Matrices? Discuss various types of sparce matrices. (5)

(b) Give an algorithm to evaluate a given postfix expression. (5)

(c) Write a 'C' function to Insert an element into a Linear Queue. (5)

Q3. (a) What is a Stack? Give the algorithm for converting a given Infix expression to its postfix notation. Using the above algorithm find the postfix expression of the following infix expression. (11)
$(A+B)/ (C*D+E)$

(b) Consider a circular queue initially having 3 elements A, B, C inserted in same sequence and having a maximum capacity of 5 elements. Show the current value of FRONT & REAR. Delete 2 elements from the queue and insert 4 more elements (D, E, F, G) in the queue and show final position of REAR & FRONT. (4)

UNIT-II

Q4. (a) Write a 'C' functions for deleting a node from the beginning of a Linear Linked list. (5)

(b) Write a short note on doubly linked list and explain with an example deletion of a node from the middle of the list. (5)

(c) Write a 'C' recursive function for Inorder traversal of a binary tree. (5)

Q5. (a) Write an algorithm to search for an 'ITEM' in an already existing unordered linked list. (6)

P.T.O.
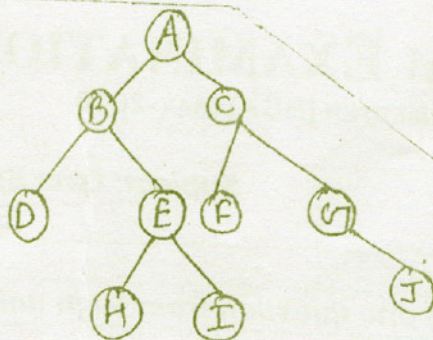
(b) Give the Inorder, Preorder and Postorder traversals of the following binary tree. **(9)**

UNIT-III

Q6. (a) Consider the list of following numbers: **(10)**
14, 10, 17, 12, 11, 20, 18, 25, 8, 22, 23
Create a binary search tree. Then show the various trees obtained after deletion of (i) node 11 (ii) node 22 (iii) node 20

(b) Create a binary tree if the following Preorder and Inorder Traversals of the tree are given: **(5)**

Preorder :	A	B	D	F	E	J	G	C	H	I
Inorder :	F	D	B	J	E	G	A	H	I	C

Q7. Create a B-tree of order 5 with the following keys inserted in the sequence from left to right. **(15)**
a g f b k d h m j e s i r x c l n t u p
Also show the tree after deletion of the key 'p' from the tree.

UNIT-IV

Q8. (a) Sort the following list using Insertion sort. **(7)**
44 33 11 55 77 90 40 60

(b) What is Hashing? Discuss any two Hash functions. What is collision resolution? **(8)**

Q9. (a) Give algorithm for bubble sorting. **(5)**

(b) Write a 'C' function for searching an item from a given list using Binary search. Also explain the working of the algorithm by taking a suitable example. **(10)**

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END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY- JUNE 2007

Paper Code: BCA-108   Subject: Data Structure using 'C' (2005-2006 Batch)

Time : 3 Hours   Maximum Marks : 75

Note: Attempt all questions. Internal choice is indicated.

Q1.   Write notes on the following:-   (2.5 x 10 =25)

(a) Stacks

(b) Sparse Matrix

(c) D-queues

(d) Reverse Polish Notation

(e) AVL Tree

(f) Doubly Linked List

(g) Recursion

(h) Hashing

(i) Heaps

(j) Time-space Trade off

Q2.   (a) Write algorithm for PUSH and POP operations when an array is implemented as a stack.   (6.5)

(b) Transform the following expression into its equivalent Postfix expression using stack.   (3)

$A+(B * C – (D/E \uparrow F) * G) * H$.

(c) Evaluate the followig Postfix expression   (3)

2,3,10, +, *, 8, 2, /, -

OR

Q3.   Given two arrays of integers in ascending order. Develop an algorithm to merge these arrays to form a third array sorted in ascending order.   (12.5)

Q4.   (a) A binary tree T has 9 nodes. The in-order and Pre-order traversals of T yield the following sequences of nodes.   (5.5)

5, 1, 3, 11, 6, 8, 4, 2, 7   (In order)

6, 1, 5, 11, 3, 4, 8, 7, 2   (Pre-order)

Find the binary tree.

(b) Write a recursive procedure for the Post-order traversal of a binary tree.   (3)

(c) Write an algorithm for insertion in a binary tree.   (4)

OR

Q5. What are the advantages of Linked Lists over Array? Write a 'C' program to create a doubly linked list of integer data using the concept of structures. (12.5)

Q6. What is multilevel indexing? What are M-way search trees? How M-way search tree is used as indexes. Explain the deletion operation in B tree with the help of example. (12.5)

OR

Q7. Answer the following questions in the context of given binary tree. **(1.25 x 10 =12.5)**
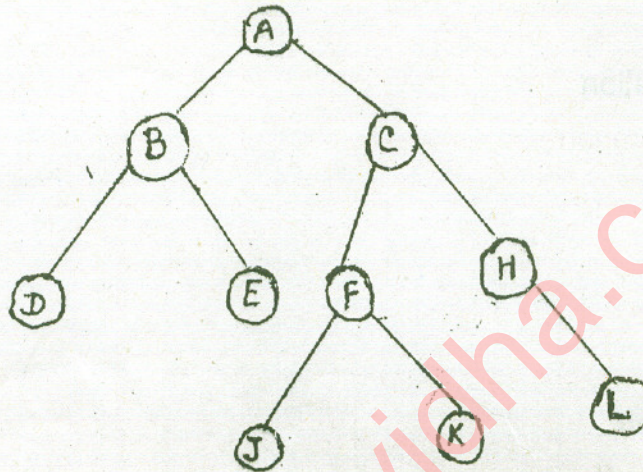
(a) Which nodes are leaf nodes?

(b) Which is the root node?

(c) What is the height of the tree?

(d) Which nodes are non-leaf nodes?

(e) Which nodes are descendents of node C?

(f) Which nodes are ancestors of node C?

(g) What is the Pre-order traversal of tree?

(h) What is the In-order traversal of tree?

(i) What is the Post-order traversal of tree?

(j) What is the level order traversal of tree?

Q8. Write a complete C program sorting an array of given integer using Insertion Sort.

77, 33, 44, 11, 88, 22, 66, 55

How many passes are required to sort the above array of integers? Write the Worst case and Average Case of Insertion Sort. (12.5)

OR

Q9. How binary search is different from linear search? Explain.

Write a complete C program to implement binary search on given data