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**NEW SCHEME**

**Third Semester B.E. Degree Examination, Dec. 06 / Jan. 07**

**CS / IS**

**Data Structures with C**

Time: 3 hrs.]

[Max. Marks:100

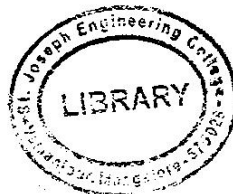
**Note: Answer any FIVE full questions.**

1. a. What are bit fields? What is the advantage of using bit fields? Summarise the rules for defining and using bit field with suitable examples. (07 Marks)  
 b. What are command line arguments? Write a C program to accept the file name and text through command line arguments? Create a file with text and print the text on the screen. (08 Marks)  
 c. Write recursive function for Fibonacci series for the  $n^{\text{th}}$  number. (05 Marks)
2. a. What is recursion? Give the properties of a recursive definition of an algorithm. What are its advantages? (05 Marks)  
 b. Show the detailed contents of the stack and trace of the algorithm to evaluate the given post fix expression,  $123 + * 321 - + *$  (05 Marks)  
 c. What is a heap? Write a 'C' program to sort an array of integers using the heap sort method. Given 30, 61, 52, 42, 15, 90, 88, 37 are the elements of an array. Show the different stages of sorting. (10 Marks)
3. a. What is a stack? List the applications of stack. Write a 'C' function to insert an element on the top of stack. (06 Marks)  
 b. What is linked list? Write a 'C' function search (l, x) that accepts a pointer 'l' to a list of integers and an integer x and returns a pointer to a node containing x if it exists, and the null pointer otherwise. (08 Marks)  
 c. Mention different methods used for generating hash functions and explain them briefly. (06 Marks)
4. a. Write advantages of doubly linked list over singly linked list. Write 'C' function that will insert a given integer value into an ordered doubly linked list. (10 Marks)  
 b. Define input restricted queue. Show with suitable 'C' program how we can implement a stack and a queue using the operations of input restricted queue. (10 Marks)
5. a. Construct a binary tree for the expression  $12 + 3 - 21 + 3\$ -$  and draw the diagram showing each step. (07 Marks)  
 b. Explain various types of tree traversal with examples. (06 Marks)  
 c. What do you understand by dynamic memory allocation? Explain any three functions that support dynamic memory allocation. (07 Marks)
6. a. In a singly linked list write the 'C' function to  
 i) To delete a node whose info field is specified.  
 ii) To delete a node at specified position. (08 Marks)  
 b. What are binary trees? Mention different types of binary trees and explain any two of them clearly. (06 Marks)  
 c. Explain any one collision resolving technique. (06 Marks)
7. a. Explain radix sort with example. Write the suitable algorithm for Radix sort. (10 Marks)  
 b. What is a circular queue? Write 'C' program to implement circular queue using arrays with operations of INSERT (), DELETE () and DISPLAY (). (10 Marks)
8. Write short notes on:  
 a. File opening and closing functions in C  
 b. Sequential searching using an auxiliary table  
 c. Threaded binary tree  
 d. Simple insertion sort. (20 Marks)

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### Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08

### Data Structures with C

Time: 3 hrs.

Max. Marks:100

**Note : Answer any FIVE full questions.**

- a. Given the following declarations:

```
int x ; double d; int *p; double *q;
```

Which of the following expressions are not allowed?

i)  $p = \&x$ ; ii)  $p = \&d$ ; iii)  $q = \&x$ ; iv)  $q = \&d$  v)  $p = x$ ;

(05 Marks)

- b. Show what would be printed from the following block:

```
/* local definitions */
```

```
int x [2] [3] = {
    { 4, 5, 2 },
    { 7, 6, 9 }
};
```

```
/* statements */
```

```
fun (x);
```

```
fun (x+1);
```

```
return 0;
```

```
}
```

```
void fun (int (*p)[3])
```

```
{
```

```
    print f("In %d %d %d", (*p)[0], (*p)[1], *p[2]);
```

```
    return;
```

```
}
```

(06 Marks)

- c. Briefly explain memory allocation functions.

(09 Marks)

- a. Implement i) Copying one string to another ii) Reversing the given string.

Without using string library functions in 'C'.

(12 Marks)

- b. Write a C program to represent a complex number using structure and add two complex numbers.

(08 Marks)

- a. Define stack and operations over stack. Implement reversing a string using stack (array implementation) in C.

(12 Marks)

- b. What is recursion? Explain efficiency of recursion. Write a 'C' recursive program to solve tower of Hanoi problem.

(08 Marks)

- a. Write a C program to implement multiple stacks using single array.

(12 Marks)

- b. What is a linear queue? What are the applications of linear queue? Implement insert and delete operations.

(08 Marks)

- a. Given an ordered linked list whose first node is denoted by 'start' and node is represented by 'key' as information and 'link' as link field. Write a C program to implement deleting number of nodes (consecutive) whose 'key' values are greater than or equal to ' $K_{min}$ ' and less than ' $K_{max}$ '.

(12 Marks)

- b. Write a C program to implement insertion to the immediate left of the  $K^{th}$  node in the list.

(08 Marks)

- a. Write a C program to implement doubly linked list with following operations:

i) Create ii) Insert.

(10 Marks)

- b. Implement concatenation of two circular singly linked lists List 1 and List 2. Use header nodes to implement the list.

(10 Marks)

- a. Implement Binary tree traversals in C: i) Inorder ii) Preorder iii) Postorder.

(10 Marks)

- b. What are the applications of binary tree? Implement binary search tree and check for duplicate data.

(10 Marks)

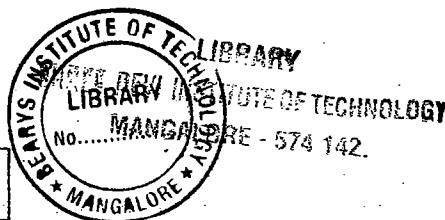
Write short notes on:

- a. Threaded binary tree b. Applications of stacks c. Array implementation of binary trees.

- d. Structures and unions.

(20 Marks)





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**Third Semester B.E. Degree Examination, Dec 08 / Jan 09**  
**Data Structures with C**

Time: 3 hrs.

Max. Marks:100

**Note : Answer any FIVE full questions, selecting at least TWO from each part.**

**PART - A**

- 1 a. Write the output for the following program (04 Marks)
- ```
#include <stdio.h>
void main ()
{
    int a = 7, b = 8 ; * p, * q ;
    p = & a
    q = & b
    print f (" 1n % d", ++a) ;
    print f (" 1n % d", ++(*p)) ;
    print f (" 1n % d", --(*q)) ;
    print f (" 1n % d", --b) ;
}
```
- b. What would be printed from the following block, explain. (08 Marks)
- ```
Void main ()
{
    int num [5] = {3, 4, 6, 2, 1};
    int * p = num;
    int * q = num + 2 ;
    int * r = snum [1] ;
    print f ("1n% d % d", num [2], * (num + 2));
    print f ("1n% d % d", * p, *(p + 1));
    print f ("1n% d % d", * q, *(q + 1));
    print f ("1n% d % d", * r, *(r + 1));
}
```
- c. What do you understand by Dynamic Memory Allocation? Explain any three function that support dynamic memory allocation. (08 Marks)
- 2 a. Write a function newstrcpy and newstrcat that does the same job as strcat and strcpy without using library function. (06 Marks)
- b. Explain the following function with suitable examples. i) fseek ( ) ii) rewind ( ) (06 Marks)
- iii) ftell ( ).
- c. List the differences between union and structures. Write a structure student with id, name and marks 1, marks 2, marks 3. Write functions read \_ data ( ) to read 5 students data and print \_ data ( ) to display the student details. (08 Marks)
- 3 a. Transfer each of the following infix expression to its postfix form
- i)  $(A + B) * (C \& (D - E) + F) - G$  ii)  $(A + B) * (C - D) \& E * F$ . (06 Marks)
- iii)  $A + (((B - C) * (D - E) + F) / G) \& (H - J)$ .

- b. Show the detailed contents of stack for a given postfix expression  $623 + - 382 / + * 2 \& 3 +$  and evaluate the expression. (08 Marks)
- c. Write a 'C' function to check whether a string is palindrome to not using stack. (06 Marks)
- 4 a. What is Recursion? Write a recursive function for Binary search. (06 Marks)
- b. What is Priority Queue? Explain about different types of priority queues. (05 Marks)
- c. Write a C program to simulate the working of circular queue of integers using array. Provide the following operations. i) Insert ii) Delete iii) Display. (09 Marks)

### PART - B

- 5 a. Explain how the linked list can be represented using arrays. (04 Marks)
- b. Write a C function to merge two ordered linked list. (06 Marks)
- c. Write a C program to perform the operation on stack using singly linked list. (10 Marks)
- 6 a. Explain the following : i) Circular list ii) Doubly linked list. Using suitable diagrams. (06 Marks)
- b. Write a C routine to perform following operations using circular linked list.  
i) To place the elements of a list in increasing order.  
ii) To find the sum of integers and the number of elements in a list. (10 Marks)
- c. What are the advantages and disadvantages of representing group of item as an array versus a linear linked list? (04 Marks)
- 7 a. Write a expression tree for the following postfix expression.  $ab + cd - * ef + /$ . (06 Marks)
- b. Write inorder, preorder and postorder traversals for the following tree ( ref. Fig.7(b)) (06 Marks)

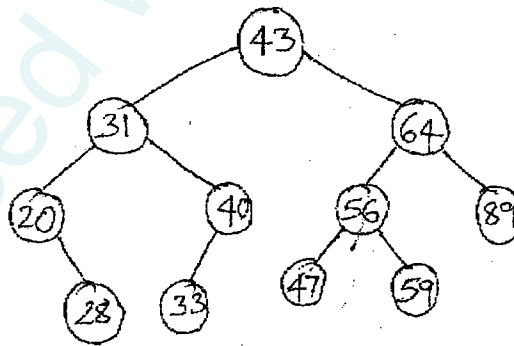
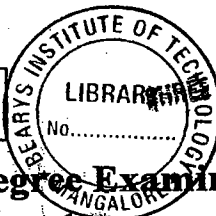


Fig.7(b)

- c. Explain array representation of binary tree and write a function to search a given element in a Binary search tree using array representation. (08 Marks)
- 8 a. Write a function to : i) Find the maximum element in the Binary search tree. ii) To search an element in the tree. (08 Marks)
- b. Explain the following : i) Binary search tree ii) Threaded binary tree iii) Strictly binary tree iv) Almost complete binary tree. (08 Marks)
- c. Write a C routine to count the numbers of nodes in a Binary search tree. (04 Marks)

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## Third Semester B.E. Degree Examination, Dec.09/Jan.10

### Data Structures with 'C'

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting at least TWO questions from each part.**

#### PART - A

- 1 a. Given the following declarations:
 

```
int a = 5 ;
int b = 7 ;
int *p = &a ;
int *q = &b ;
```

 What is the value of each of the following expressions?
  - i) ++a
  - ii) ++(\*p)
  - iii) --(\*q)
  - iv) --b

(04 Marks)
- b. Explain the following with an example:
  - i) Pointer to pointer
  - ii) L value and R value
  - iii) Calloc function.

(09 Marks)
- c. Write a 'C' program to find the smallest element in an array (using pointer and function).
 

(07 Marks)
- 2 a. Explain with syntax strcpy and strcat string handling functions.
 

(06 Marks)
- b. Write short notes on:
  - i) Nested structures
  - ii) Union.

(08 Marks)
- c. Explain the three file status functions available in 'C' language.
 

(06 Marks)
- 3 a. What is a stack? Indicate how stack is represented in 'C'.
 

(05 Marks)
- b. Write an algorithm to evaluate postfix expression.
 

(06 Marks)
- c. Convert each of the following infix expressions into its postfix and prefix form
  - i)  $(A + B) * C - D * E * F$
  - ii)  $A - B / C * D * E$
  - iii)  $(A + B) * (C + D - E) * F$ .

(09 Marks)
- 4 a. Write a recursive program to find the greatest common divisor (GCD) of two integers.
 

(06 Marks)
- b. Explain :
  - i) Efficiency of recursion
  - ii) Priority queue.

(06 Marks)
- c. Write a C program to simulate the working of linear queue. Provide the following operations: i) insert ; ii) delete ; iii) display.
 

(08 Marks)

## PART – B

- 5 a. What are the advantages and disadvantages of representing a stack or queue by a linked list? (04 Marks)  
 b. Write a C program to implement stack operations using singly linked list. (10 Marks)  
 c. Write a note on noninteger and nonhomogeneous list. (06 Marks)
- 6 a. Explain with figure circular list with a header node. (05 Marks)  
 b. Write a C routine concat (& list 1, & list 2) that concatenates two circular singly linked lists. (05 Marks)  
 c. Assume that first and last are external pointers to the first and last nodes of a doubly linked list. Write an algorithm to implement the following:  
 i) Insert a node to the list at the front end.  
 ii) Delete a node from the front end. (10 Marks)
- 7 a. Define the following (write appropriate figures)  
 i) Strictly binary tree  
 ii) Complete binary tree  
 iii) Almost complete binary tree. (09 Marks)  
 b. What is a binary search tree? Construct a binary search tree for the following list of integers: 8, 13, 10, 12, 6, 5, 12. (06 Marks)  
 c. Write a C routine setleft (NODEPTR P, int x) which creates a node with information x, as left son of a node pointed by P, in a right – in – threaded binary tree. (05 Marks)
- 8 a. Write an algorithm to find the  $K^{th}$  element of a list represented by binary tree. Explain the algorithm also. (05 Marks)  
 b. Construct a binary tree for the following expressions:  
 i)  $A + (B - C) * (E + F) / G$   
 ii)  $(5 + 6 * 7) \$ ((5 + 6) * 7)$ . (10 Marks)  
 c. Convert the following general tree shown in Fig. 8 c(i) and 8 c(ii) to a binary tree (05 Marks)

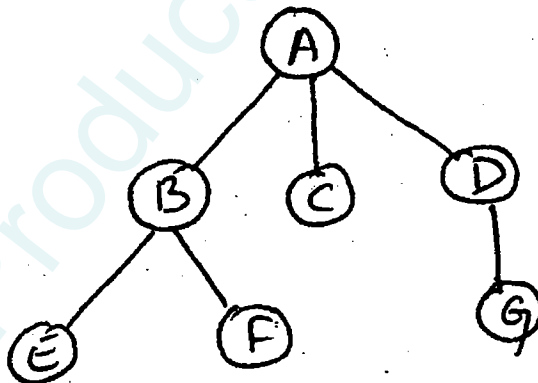


Fig.8 c(i).

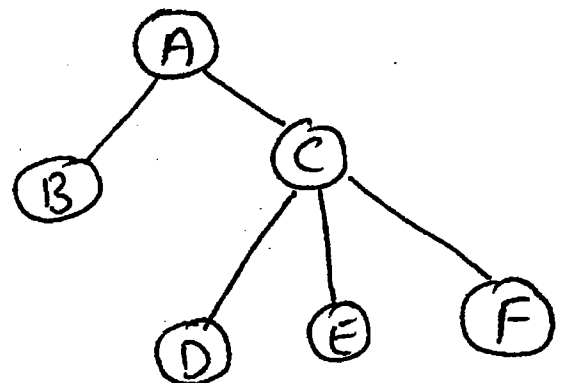


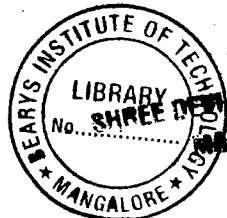
Fig.8 c(ii).

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## Third Semester B.E. Degree Examination, June/July 08

### Data Structure with C

Time: 3 hrs.

Max. Marks:100

**Note :** Answer any FIVE full questions selecting at least TWO from each part.

#### Part – A

1. a. What is a pointer variable? Can we have multiple pointers to a variable? Explain Lvalue and Rvalue expressions. (06 Marks)
- b. Give atleast two differences between
  - i) Static memory allocation and Dynamic memory allocation
  - ii) malloc() and calloc()
 (04 Marks)
- c. i) Write a C program using pass by reference method to swap two characters. (10 Marks)
- ii) Give any two advantages and disadvantages of using pointers.
2. a. How is a string stored in memory? Is there any difference between string and character array? Write a C program to copy one string to another, using pointers and without using library functions. (06 Marks)
- b. How does a structure differ from an union? Mention any two uses of structures. What is bit field? Why are bit fields used with structures? (07 Marks)
- c. What is a file pointer? Explain with syntax fopen(), fread() and fwrite() functions. (07 Marks)
3. a. How do you define data structure? How is stack a data structure? Give a C program to construct a stack of integers and to perform all necessary operations on it. (10 Marks)
- b. Write an algorithm to convert a valid infix expression to a postfix expression. Also evaluate the following suffix expression for the values  $A = 1$ ,  $B = 2$ ,  $C = 3$   
 $AB + C - BA + C\$$  (10 Marks)
4. a. Define recursion. Give atleast three differences between iteration and recursion. (04 Marks)
- b. Write a C program using recursion to find GCD of two numbers. (06 Marks)
- c. What is the advantage of circular queue over ordinary queue? Mention any two applications of queues. Write an algorithm CQINSERT for static implementation of a circular queue. (10 Marks)

#### Part – B

5. a. List out any two applications of linked list and any two advantages of doubly linked list over singly linked list. (04 Marks)
- b. Write a C program to simulate an ordinary queue using singly linked list. (10 Marks)
- c. Give an algorithm to insert a node at the specified position for a given singly linked list. (06 Marks)
6. a. Write a C program to perform following operations on a doubly linked list.
  - i) To create the list by adding each node at the front.
  - ii) To display all the elements in reverse order. (10 Marks)
- b. Write a C program to create a linked list and interchange the elements to the list at position m and n and display contents of the list before and after interchanging the elements. (10 Marks)

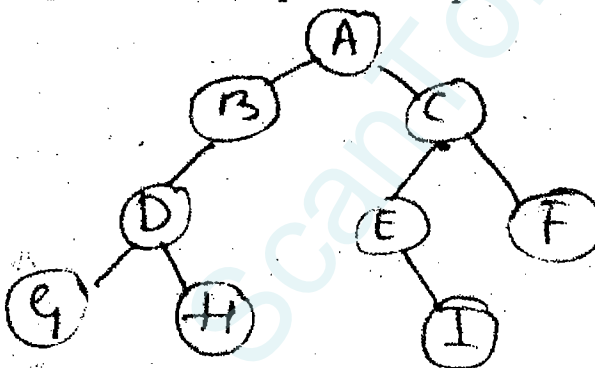
7 a. Define the following :

- i) Binary tree
- ii) Complete binary tree
- iii) Almost complete binary tree
- iv) Binary search tree
- v) Depth of a tree

(10 Marks)

b. Given the following graph, write inorder, preorder and postorder traversals.

(06 Marks)



c. In brief, describe any four applications of trees.

(04 Marks)

8 a. Construct a binary tree for  $((6 + (3 - 2) * 5) \wedge 2 + 3)$

(08 Marks)

b. Construct a binary tree from the traversal order given below :

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

(08 Marks)

c. What is threaded binary tree? Explain right in and left in threaded binary trees.

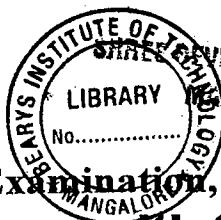
(04 Marks)

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## Third Semester B.E. Degree Examination, June-July 2009

### Data Structures with C

Time: 3 hrs.

Max. Marks:100

- Note :** 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.  
2. Assume missing data if any.

#### PART - A

1.
  - a. What is a pointer variable? Can we have multiple pointer to a variable? Explain Lvalue and Rvalue expression. (06 Marks)
  - b. Write a note on dynamic memory allocation. (08 Marks)
  - c. Show the output of the following block.  

```

Main ()
{
    int num [5] = {3, 4, 6, 2, 1}
    int * p = num;
    int * q = num+2;
    int * r = & num [1];
    printf ("\n %d %d", num[2], *(num+2));
    printf ("\n %d %d", * p, *(p+1));
    printf ("\n %d %d", * q, *(q+1));
    printf ("\n %d %d", * r, *(r+1));
}

```

(06 Marks)
2.
  - a. What is a structure? How it is different from array? Explain different types of structure declaration with examples and its initialization. (08 Marks)
  - b. Write a function that accepts a string and returns 1 if the string is palindrome else '0' if string is not a palindrome without using any built in function. (06 Marks)
  - c. Write a note on fseek ( ) and ftell ( ) functions. (06 Marks)
3.
  - a. What is a stack? List and Implement basic operation in stack using C. (10 Marks)
  - b. Write an algorithm to evaluate a postfix expression. Trace the same algorithm with stack contents for the following expression  $A B C + * C B A - + *$  with  $A = 1, B = 2, C = 3$ . (10 Marks)
4.
  - a. Define recursion. Write a recursive function for computing  $n^{th}$  term of a Fibonacci sequence. Hence give the trace of stack contents for  $n = 4$ . (10 Marks)
  - b. What is a circular queue? Write implementation of circular queue using array. Also write following routine of circular queue. (10 Marks)
    - i) Insertion
    - ii) Deletion
    - iii) Display.

#### PART - B

5.
  - a. What is linked list? With a neat diagram show how an element is added and removed from the front end of the list. (10 Marks)

- b. What is a Header node? Give example with neat diagram. (04 Marks)
- c. Write a C function insend (plist, x) to insert the element 'x' at the end of the list 'list'. (06 Marks)
- 6 a. List out the advantages and disadvantages of doubly linked list over singly linked list. (04 Marks)
- b. Write a program to insert a given value into an ordered doubly linked list into its proper position. (06 Marks)
- c. Write a C program to perform following operation
- i) Create a list adding nodes at front
  - ii) Delete a node at given position. (10 Marks)
- 7 a. Define following terms : i) Binary tree ii) Strictly binary tree iii) Complete binary tree iv) Almost complete binary tree. (08 Marks)
- b. Write a C routine to construct a binary search tree and check for duplicate data. Draw binary search tree constructed for following input.  
14, 5, 6, 2, 18, 20, 16, 18, -1, 21. (12 Marks)
- 8 a. Draw a binary tree for the following expression  $3 + 4 * (6 - 7) / 5 + 3$ . Traverse above constructed tree using pre order and post order. (06 Marks)
- b. Write a C function that accepts a pointer to a binary tree and a pointer to a node of the tree and returns the level of the node in the tree. (06 Marks)
- c. What do you mean by a threaded binary tree? Discuss the impact of such a representation on tree traversal procedure. (08 Marks)

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### Third Semester B.E. Degree Examination, May/June 2010 Data Structures with C

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, selecting at least TWO questions from each part.

#### PART - A

1. a. What is a pointer? What are the uses of pointers in C? (05 Marks)  
 b. Explain what is meant by lvalue and rvalue, with examples. (05 Marks)  
 c. Write a C program to read ten integers and store them in an array using pointers. Print their sum and average. (10 Marks)
2. a. What is a string? How is a string declared and initialized? (05 Marks)  
 b. Write appropriate structure definition and variable declarations to store following information about 100 students:  
 Name, USN, Gender, Date of birth and marks in three subjects  $S_1$ ,  $S_2$  &  $S_3$ .  
 Date of birth should be a structure containing fields day, month and year. (05 Marks)  
 c. Write a function that given a binary file, copies the odd items (item 1,3,5,...,n) to a second binary file and the even items (item, 2,4,6,8,...,n+1) to a third binary file. (10 Marks)
3. a. Define stack. Briefly explain the primitive operations on the stack. (05 Marks)  
 b. Show using the tabular columns, how the expression  $(A+B)*C$  is converted into a postfix expression according to the infix to postfix conversion algorithm. (05 Marks)  
 c. Write the algorithm to evaluate a valid postfix expression and hence evaluate the postfix expression :  

$$6 \quad 2 \quad 3 \quad + \quad - \quad 3 \quad 8 \quad 2 \quad / \quad + \quad *$$
  
 All the operands are single digit positive integers and operators are binary in nature. (10 Marks)
4. a. Determine what the following recursive C function computes:  

```
int func(int n)
{
    if (n == 0)
        return(0);
    return(n + func(n - 1));
} /* end of func */
```

  
 Write an iterative function to accomplish the same. (05 Marks)  
 b. Explain the working of a simple queue. (05 Marks)  
 c. Write a recursive function fact(n) to find the factorial of an integer. Diagrammatically explain, how the stacking and unstacking takes place during execution for fact(4). (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg,  $42+8=50$ , will be treated as malpractice.

**PART – B**

- 5 a. What is a linear linked list? Write the algorithm to add an element to the front of the list. (05 Marks)
  - b. What are the advantages and disadvantages of representing a group of items as an array versus linear linked list? (05 Marks)
  - c. Write the following C routines for the dynamic implementation of a linked list. NODEPTR is of type pointer to a node.
    - i) void insertafter(NODEPTR p, int x) which inserts a node with information x after a node pointed to by p.
    - ii) void place(NODEPTR \*plist, int x) which inserts a node with information x at a proper position within the linear linked list pointed to by \*plist. The list is assumed to contain information in the increasing order. (10 Marks)
- 
- 6 a. What is a circular list? Explain with a diagram. (05 Marks)
- b. Compare linear linked list and doubly linked list, with diagrams. (05 Marks)
- c. Give the C implementation of stack as circular list. (10 Marks)
- 
- 7 a. With reference to the b-tree in Fig.Q7(a), give the three traversals (05 Marks)

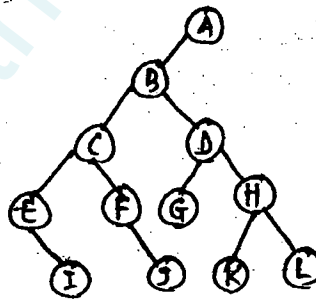


Fig.Q7(a)

- b. i) Define strictly binary tree. Is the tree in Fig.Q7(a), a strictly b-tree. .  
ii) Define almost-complete b-tree. Is the tree in Fig.Q7(a), an almost complete b-tree. .  
(05 Marks)
- c. With reference to the dynamic node representation of b-tree, write the following C routines:  
i) NODEPTR maketree(int x) which creates a node with information x.  
ii) Void setleft(NODEPTR, int x) which sets a node with contents x as the left son of the node pointed to by p.  
(10 Marks)
- 8 a. With an example, show how a list can be represented as binary tree. (05 Marks)  
b. Define the following terms with reference to general trees:  
Father, son, brother, forest and ordered tree. (05 Marks)  
c. Give the node structure of an expression tree. Explain how the expression is evaluated.  
(10 Marks)

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**NEW SCHEME****Third Semester B.E. Degree Examination, July 2007  
CS / IS****Data Structures with C**

Time: 3 hrs.]

[Max. Marks:100

**Note : Answer any FIVE full questions.**

- 1
  - a. What is a structure in C? How is it different from an array? Explain with example how a structure is declared and initialized. (06 Marks)
  - b. Explain with examples, the use of following operators referring to structures and pointers in C. i) dot ii) asterisk iii) arrow. (06 Marks)
  - c. Write a C program to read and store following information of 100 students: name, roll-number and marks. The program should print the names of all students whose name starts with 'S' and have scored more than 70 marks. Use structures. (08 Marks)
- 2
  - a. What is dynamic memory allocation? What are its merits? Differentiate between malloc( ) and calloc( ) functions. (06 Marks)
  - b. Explain fseek( ) and ftell( ) functions with examples. (06 Marks)
  - c. Write a C program to copy the contents of one file into another. Use command line parameters to accept the filenames. (08 Marks)
- 3
  - a. Define stack. Explain the basic operations and applications of stack. (06 Marks)
  - b. Write an algorithm to convert an infix string (without parenthesis) into a postfix string. (06 Marks)
  - c. Write the algorithm to evaluate a valid postfix expression. Hence evaluate the postfix expression  $ABC + * D /$  where  $A = 1, B = 2, C = 3$  and  $D = 4$ . (08 Marks)
- 4
  - a. What is recursive definition? Explain the recursive definition for the factorial of a number. (06 Marks)
  - b. Write a recursive function for multiplication of natural numbers. (06 Marks)
  - c. Implement ordinary queue using array. Check for under flow and overflow conditions. (08 Marks)
- 5
  - a. What is a linked list? Explain with diagrams how nodes can be added and deleted from the middle of the linked list. (06 Marks)
  - b. Write a C routine insert end (plist, X) to insert the element X at the end of the singly linked list pointed by plist. (06 Marks)
  - c. Give the dynamic implementation of queue as a linear list. (08 Marks)
- 6
  - a. Explain a doubly linked list. What are its advantages and disadvantages over a singly linked list? (06 Marks)
  - b. With respect to the binary tree of figure Q6(b), answer the following with reasons:

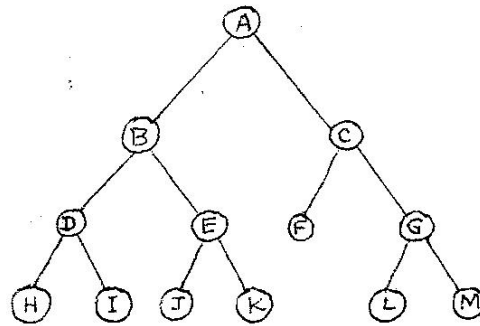


Fig. Q6(b)

- i) Is it a strictly binary tree?
  - ii) Is it a complete binary tree?
  - iii) Is it an almost complete binary tree? (06 Marks)
  - c. Write a C routine setright (NODEPTR P, int X) which creates a node with information x, as the right son of a node pointed by p, in a right-in-threaded binary tree. (08 Marks)
- 7
- a. What is a tree? How it is different from binary tree? Give the structure of a node of a binary tree. (06 Marks)
  - b. Explain how the following list of numbers can be sorted using Radix sort:  
25, 57, 48, 37, 12, 92, 86, 33 (06 Marks)
  - c. Explain the indexed sequential search with example. (08 Marks)
- 8 Write short notes on:
- a. Header nodes.
  - b. Implicit array representation of binary tree.