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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 strncpy 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  $K^{\text{th}}$  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)

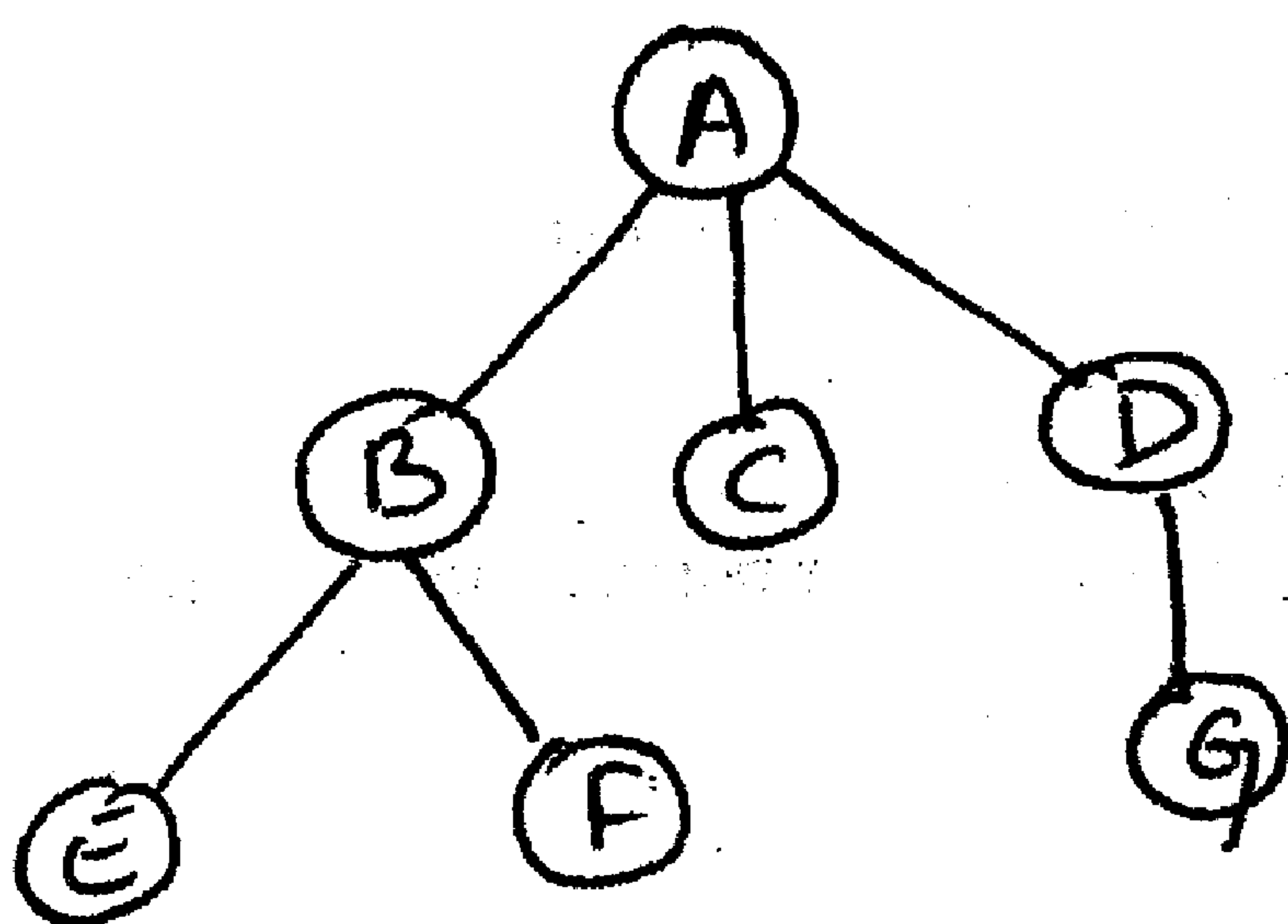


Fig.8 c(i).

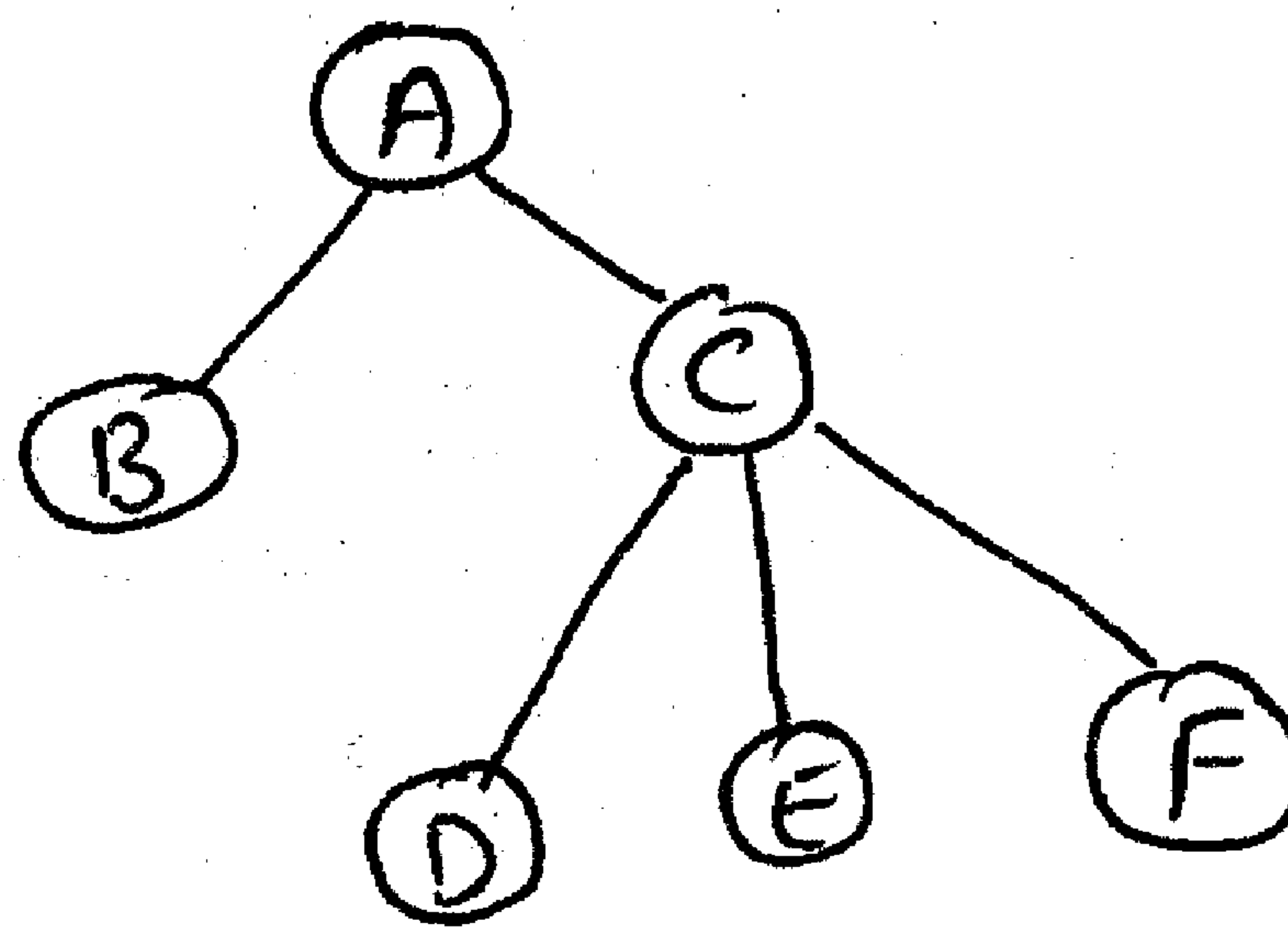


Fig.8 c(ii).

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