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3 (Sem-3/CBCS) CSC HC 1

2023

COMPUTER SCIENCE

(Honours Core)

Paper : CSC-HC-3016

(Data Structures)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following as directed/Choose the correct answer : $1 \times 7 = 7$

(a) Linked list is a

(i) static data structure

(ii) dynamic data structure

(iii) in-built data structure

(iv) None of the above

Contd.

(b) The expression in which the operator symbol is placed after the operands, is called—

- (i) Polish notation
- (ii) Reverse polish notation
- (iii) Infix notation
- (iv) None of the above

(c) Which of the following is non-linear data structure ?

- (i) Linked list
- (ii) Array
- (iii) Tree
- (iv) All of the above

(d) The complexity of quick sort algorithm is $O(n \log n)$ for—

- (i) best case
- (ii) average case
- (iii) worst case
- (iv) All of the above

(e) Minimum height of a binary tree having n nodes is _____. (Fill in the blank)

(f) There is no hashing method without the possibility of collision.

(State True or False)

(g) _____ is a FIFO data structure. (Fill in the blank)

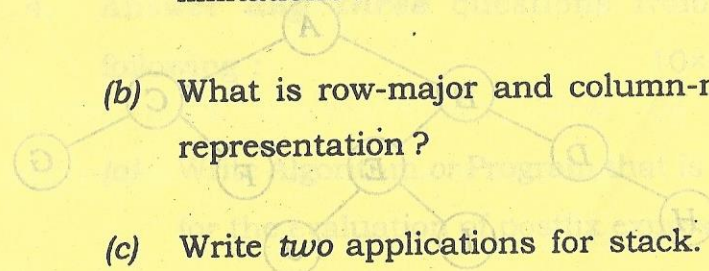
2. Answer the following questions :

$2 \times 4 = 8$

(a) Write down the limitation of Array. How linked list is used to overcome such limitations ?

(b) What is row-major and column-major representation ?

(c) Write *two* applications for stack.



(d) Convert the following infix expression to postfix notation :

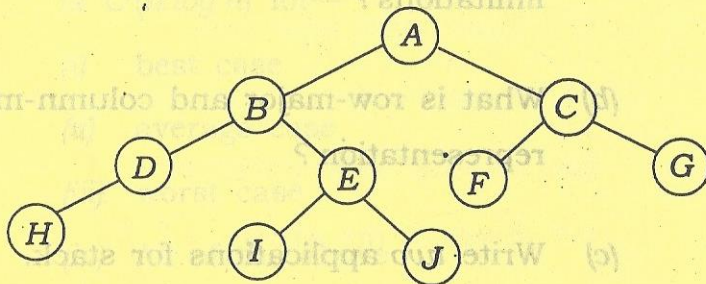
$$P - (Q/R + (S * T \uparrow U)V)$$

3. Answer **any three** questions from the following : $5 \times 3 = 15$

(a) Define stack. Write **one** advantage and **one** disadvantage for each of the following :

- (i) Array implementation of stack
- (ii) Linked list implementation of stack

(b) Write down the result of inorder, preorder and postorder traversals of the following binary tree :



(c) Construct the binary tree from given inorder and preorder traversals as follows :

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

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

(d) Write an Algorithm or C-program for implementing the binary search technique.

(e) Describe collision resolving by using the separate chaining (Open Hashing) technique.

4. Answer **any three** questions from the following : $10 \times 3 = 30$

(a) Write Algorithm or Program that is used for the evaluation of postfix expression.

(b) Write Algorithm or Program to implement a Queue using Array.

(c) Write a computer program to implement a Singly Linked List for inserting an element at the beginning of the list, and deleting an element from the end of the list.

(d) Write a computer program to implement a Doubly Linked List for inserting an element at the end of the list, and deleting an element from the beginning of the list.

(e) Write non-recursive algorithm to traverse a binary tree in preorder and postorder.

(f) Write merge sort algorithm and explain its working with suitable example.
