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 : 1×7=7

(a) Linked list is a

(i) static data structure

(ii) dynamic data structure

(iii) in-built data structure

(iv) None of the above

(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 : 2×4=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 :

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

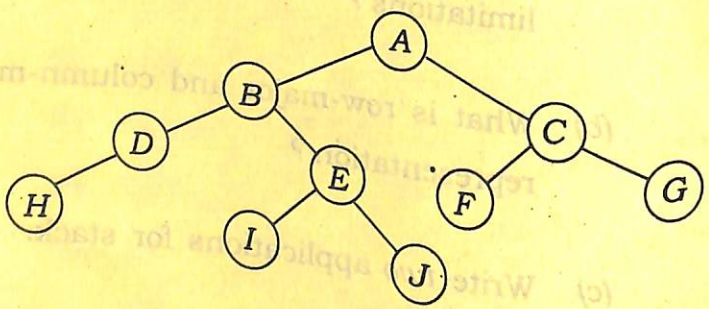
3. Answer ***any three*** questions from the following : 5×3=15

(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 : 10×3=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.

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