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3 (Sem-3/CBCS) CSC HC 1
2021

(Held in 2022)

COMPUTER SCIENCE

(Honours)

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 : $1 \times 7 = 7$

(i) In a stack, if a user tries to remove an element from an empty stack, it is called

- (a) underflow
- (b) overflow
- (c) empty
- (d) push

(Choose the correct answer)

(ii) Assuming int is of 4 bytes, what is the size of `int a[15]` ?

- (a) 15 bytes
- (b) 19 bytes
- (c) 60 bytes
- (d) 11 bytes

(Choose the correct answer)

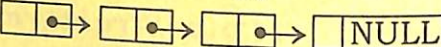
Contd.

(iii) Write *two* applications of stack data structure.

(iv) Name *two* sorting techniques.

(v) What is a binary tree ?

(vi) Consider the following pictorial representation of a singly linked list :

Start \rightarrow 

Which of the following statements will remove the second node from the list ?

(a) Start = start \rightarrow next

(b) Start \rightarrow next = start

(c) Start \rightarrow next = start \rightarrow next \rightarrow next

(d) Start \rightarrow next = start \rightarrow next \rightarrow next \rightarrow next

(Choose the correct answer)

(vii) Write an advantage of hashing.

2. Answer the following questions : $2 \times 4 = 8$

(a) Differentiate linear search and binary search.

(b) What will be the maximum height and minimum height of a binary tree with 15 elements ?

(c) Write down the advantages of doubly linked list structure over singly linked list structure.

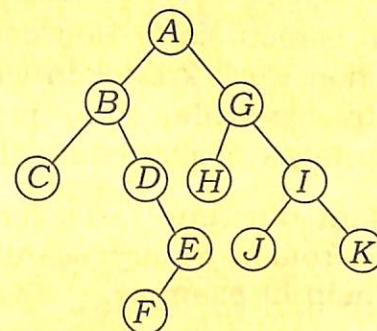
(d) Draw a binary search tree with the following elements, if you insert one after another :

10, 15, 25, 5, 4, 30, 2, 7

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

(a) Describe collision resolving by open addressing technique. 5

(b) Write down the result of inorder, preorder and postorder traversals of the following binary tree : 5



(c) Convert the following infix expression into postfix expression : 5

$a + (b * c(d/e - f) * g) + h$

(d) Write the algorithm for binary search technique. 5

(e) What is a queue ? Why is it known as FIFO data structure ? Write the ways for implementing a queue. Briefly explain *two* applications of queue. $1 + 1 + 1 + 2 = 5$

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

(a) Sort the following data using insertion sort (show the steps) : 10

7 5 1 8 3 6 0 9

(b) Write a program to implement a stack using array. 10

(c) Write a program to implement a doubly linked list for inserting an element at the beginning of the list, deleting an element from the end of the list. 10

(d) What is recursion ? How does recursive function work ? Explain with the help of an example. Also mention *two* advantages of recursion. $1+2+5+2=10$

(e) Explain different cases for deleting a node from a binary search tree with the help of example. 10

(f) Write short notes on the following :

$2\frac{1}{2} \times 4 = 10$

(i) Threaded binary tree

(ii) Circular queue

(iii) Multidimensional array

(iv) Perfect binary tree