

2018

COMPUTER SCIENCE-HONOURS

Fourth Paper

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer **question no. 1** and **any three** from the rest taking at least **one** from each **section**.

1. Answer **any four** questions.

2×4

- (a) What do you mean by complete binary tree?
- (b) What is the function of strcat () in C language?
- (c) Write the properties of a good hash function.
- (d) Differentiate between 'a' and "a" in C.
- (e) What is the maximum number of nodes in a binary tree of height h ?
- (f) What do you mean by self referential structure?
- (g) Is it possible to draw a unique binary tree from preorder and postorder traversal? – Explain.
- (h) State the advantages of using switch-case over if statement in C.

Section - I

(Data Structure - II)

- 2. (a) Prove that number of leaf nodes in a binary tree is one more than the number of nodes with degree two.
 - (b) Insert the elements 29, 1, 12, 25, 5, 36, 45, 72 in a Binary Search Tree. Show all steps.
 - (c) Derive the average case time complexity of linear search.
 - (d) The keys 12, 18, 13, 2, 3, 23, 5, 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \text{ mod } 10$ and linear probing. What is the resultant hash table? Show all steps. 4+4+2+4
3. (a) Show steps to sort the following data using quick sort.
25, 15, 30, 10, 40
- (b) Derive worst case time complexity of quick sort.
 - (c) Compare and contrast the merge sort and radix sort. 5+5+4

Please Turn Over

4. (a) What are the advantages of threaded binary tree?
(b) Define Max-heap and Min-heap with examples.
(c) An array of integers in increasing order is given to you. Is it a hap? Justify your answer.
(d) Write an algorithm to delete an element from a binary search tree. 2+4+3+5

Section - II**(Programming Through C Language)**

5. (a) When and why do we get the error message L value required? What do you mean by R value?
(b) What will be the output of the following program?

```
main ()
{
    int i = 5;
    print f ("%d%d%d%d", i++, ++i, ++i, i++);
}
```

- (c) Write a C program that ask the user to enter an integer and checks if it is even or odd using bitwise operator.
(d) Are the expressions $x[m+n]$ and $m+n[x]$ equivalent? Justify. (2+2)+4+4+2
6. (a) Describe, in brief, the different storage classes of 'C'.
(b) Differentiate between 'Call by value' and 'Call by reference'.
(c) Write a recursive function to evaluate $n!$. 6+4+4
7. (a) Differentiate between structure and union in C.
(b) What is void pointer? Why it is used?
(c) Explain the utility of `rewind ()` and `f tell ()`.
(d) Give the output of the following program.

```
# define mult (x, y) x * y
main ()
{
    int a = 4; b = 2;
    print f ("%d", mult (a+b, a-b));
}
```

- (e) Differentiate between `# include < file name >` and `# include "file name"`. 3+3+3+3+2
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