

THE OPEN UNIVERSITY OF SRI LANKA
 B.Sc DEGREE PROGRAMME: LEVEL 04
 DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
 FINAL EXAMINATION – 2015/2016
CSU2279: DATA STRUCTURES AND ALGORITHMS



DURATION: **THREE HOURS** (3 HOURS)

Date: **13th January, 2017**

Time: **1.30 p.m – 4.30 p.m**

Answer FOUR Questions ONLY.

Q1.

- What are Abstract Data Types (ADTs)?
- Describe two properties of ADTs.
- What is an Algorithm?
- What are the aspects you should consider when selecting/ designing an algorithms?
- What are the factors which depend on the running time?

Q2.

- Write a Pascal programme to calculate the area of a circle?
 (Note: - radius= r , area= πr^2)
- Write a computer programme to display a menu to the user which an option can be selected to perform a particular task.

Your menu should display as follows:

*****MENU*****

- Check Emptiness*
- Check Fullness*
- Insert an item*
- Delete an item*
- Display Content*

Press a number 1 - 5 to select an option:

Q3.

- What are the five operations in a Stack data structure?
- Describe how POP and PUSH operations work on a stack data structure by giving a suitable example.
- State four (04) main differences between the Stack data structure and the Queue data structure.
- Write down two (02) real world applications for the Stack and Queue data structures.

Q4.

a. Define the following String operations.

- POS(S1, S2)
- COPY(S1, p, l, S2)
- LENGTH(S1)
- CONCAT(S1, S2, S3)

b. What is a **Set**? What do set *union*, *difference* and *intersection* mean?

c. Write Pascal procedures/functions to implement the following Set operations.

- INSET(S): A procedure to initialize the set S.
- UNIONSETS-(S1, S2): A procedure to create the union of the two sets, S1 and S2.
- INTERSECTS (S1, S2): A procedure to create the intersection of the two sets, S1 and S2.

Q5.

- What are the two (2) parts of sorting methods?
- State main differences between those two parts of sorting methods
- Write down the steps involved in sorting the following array using the Quick Sort algorithm.

29	54	38	30	21	20	22
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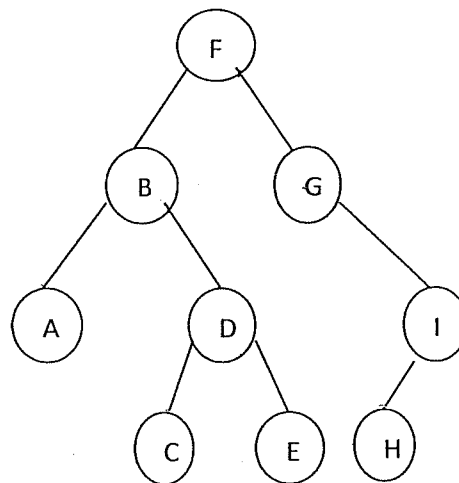
Q6.

- a) What is the main difference between the tree and the binary search tree?
- b) Create a binary tree using following the values.

160, 20, 170, 190, 30, 35, 15, 165, 28, 18, 25, 12, 200

- I. What is the depth of the tree?
- II. What is the level of 30?
- III. What is the degree of 15?
- IV. What are the leaf nodes of your tree diagram?
- V. What are the ancestors of 190?

- c) Give the outputs of Preorder, Inorder and Postorder traversals of the following tree



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