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.

a) What are Abstract Data Types (ADTs)?

b) Describe two properties of ADTs.

c) What is an Algorithm?

d) What are the aspects you should consider when selecting/ designing an algoriths?

e) What are the factors which depend on the running time?

Q2.

a) Write a Pascal programme to calculate the area of a circle?
(Note: - radius=r, area=πr^2)

b) 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******

1. *Check Emptiness*
2. *Check Fullness*
3. *Insert an item*
4. *Delete an item*
5. *Display Content*

****

Press a number 1 - 5 to select an option:

Q3.

a) What are the five operations in a Stack data structure?

b) Describe how POP and PUSH operations work on a stack data structure by giving a suitable example.

c) State four (04) main differences between the Stack data structure and the Queue data structure.

d) Write down two (02) real world applications for the Stack and Queue data structures.

Q4.

a. Define the following String operations.

i. POS(S1, S2)

ii. COPY(S1, p, 1, S2)

iii. LENGTH(S1)

iv. 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.

i. INISET(S): A procedure to initialize the set S.

ii. UNIONSETS (S1, S2): A procedure to create the union of the two sets, S1 and S2.

iii. INTERSECTS (S1, S2): A procedure to create the intersection of the two sets, S1 and S2.

Q5.

a) What are the two (2) parts of sorting methods?

b) State main differences between those two parts of sorting methods

c) Write down the steps involved in sorting the following array using the Quick Sort algorithm.

29	**54**	**38**	**30**	**21**	**20**	**22**

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 Postoder traversals of the following tree