Vavuniya Campus of the University of Jaffna

First Examination in Information and Communication Technology - 2017

Second Semester - March/April 2019

ICT1242 Practical for Data Structures

Answer All Questions

Time : Three hours

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1. (a) Write a Java program to sort a list of integers using **quick sort algorithm.**

   (b) Test your program with the following array A of elements:

	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
A [ ]	51	95	66	72	42	38	39	41	15	10

[20%]

2. (a) Write a Java class to represent the **Stack data structure.**

   (b) Write a program using the Stack data structure written in part(a) to read a string of parentheses, square brackets, and curly braces and determine whether the string is balanced.

   For example, your program should print true for the input string {()}{[()]()} and false for the input string {(}). [20%]

3. You are required to apply a **Queue data structure** for a messaging system which contains **messages**, a **message sender**, and a **message receiver**. Messages are received in the order they were sent.

(a) Write a Java class to represent the Queue data structure. [10%]

(b) Write a program using the Queue class written in part(a) to create three classes as described below:

i. A **message** has a sender, a recipient, a content string and a date.

ii. A message is placed in a Queue by a **MessageSender**.

iii. A message is removed from the Queue by a **MessageReceiver**, which can also display the contents of the Queue. [15%]

(c) Create a new instance for each of the **MessageSender**, **MessageReceiver** and the **Queue** classes. [10%]

(d) Use the MessageSender instance to add the following messages to the Queue:

Sender	Recipient	Content
John	Marry	Hi, How are you?
Roshan	Rukshy	Meet me in the evening.
Sham	Anita	Have a nice day!

[10%]

(e) Use the MessageReceiver instance to perform the following operations in order:

i. Display the queue contents.

ii. Remove the first message in the queue.

iii. Display the queue contents. [15%]