

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-1 EXAMINATION- February, 2020

B. Tech VI Semester

COURSE CODE: 18B1WCI631

MAX. MARKS: 15

COURSE NAME: Data Structure and Software Design

COURSE CREDITS: 2

MAX. TIME: One Hour

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*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

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1. A *palindrome* is a word, phrase, number, or other sequence of characters which reads the same backwards and forwards. Can you determine if a given string,  $s = \text{"racecar"}$ , is a palindrome? To solve this, we must first take each character in  $s$ , *enqueue* it in a *queue*, and also *push* that same character onto a *stack*. Once that's done, we must *dequeue* the first character from the *queue* and *pop* the top character off the *stack*, then compare the two characters to see if they are the same; as long as the characters match, we continue dequeuing, popping, and comparing each character until our containers are empty (a non-match means  $s$  isn't a palindrome).

Write the following declarations and implementations:

- i. Two instance variables: one for your *stack*, and one for your *queue*.
- ii. A *void pushCharacter(char ch)* method that pushes a character onto a stack.
- iii. A *void enqueueCharacter(char ch)* method that enqueues a character in the *queue* instance variable.
- iv. A *char popCharacter()* method that pops and returns the character at the top of the *stack* instance variable.
- v. A *char dequeueCharacter()* method that dequeues and returns the first character in the *queue* instance variable.

**Input Format**

You *do not* need to read anything from stdin. The locked stub code in your editor reads a single line containing string  $s$ . It then calls the methods specified above to pass each character to your instance variables.

**Constraints**

- $s$  is composed of lowercase English letters.

**Output Format**

- If your code is correctly written and  $s$  is a palindrome, the locked stub code will print "*The word,  $s$ , is a palindrome*"; otherwise, it will print "*The word,  $s$ , is a palindrome, is not a palindrome*".

[10 marks]

2. Describe all image based transformation matrices.

[5 marks]