



COMSATS University Islamabad
Department of Computer Science
Mid Term Examination – Fall 2022

Class: BSCS
Course Code & Title: CSC312 Theory of Automata
Time Allowed: 90 Minutes
Instructor: Ms. Memoona

Semester: 6th
Date: 21-11-2022
Max Marks: 25

Name: Saif Ur Rahman

Registration # SP20-BIS-088

Instructions

1. Mobile phones are strictly prohibited in examination hall.
2. Use black or blue ball-pen only. Markers/lead pencils are not allowed.

	Q1	Q2	Max
Total	4	21	25
Obtained			

Question 1

Mapped To CLO-1

Marks: [4]

CLO1: Describe the fundamental concepts of automata and formal language theory.

✓ Define the concepts - Theory of Computation, Complexity theory and Automata theory.

Also establish a link among these three.

Question 2

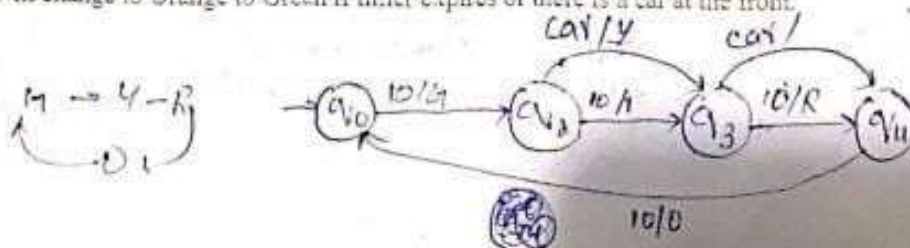
Mapped To CLO-2

Marks [4+2+4+3+8]

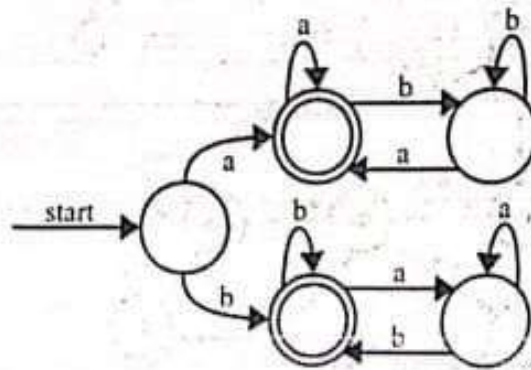
CLO2: Design various kinds of automata along with interconversion among equivalent notations.

- a) Design a Mealy Machine to represent a traffic light control system. Specifications of the system are as follows:

The system starts with the green light turned on as output. Once a light is turned on, it should stay that way for a certain minimum time, say 10 seconds, and then only change when a car comes up or time expires. Green will be changed to Yellow to Red when timer expires. And Red will change to Orange to Green if timer expires or there is a car at the front.



b) What is the language of the following Deterministic Finite Automata?



c) Convert the following Non-Deterministic Finite Automata with epsilon to simple Non-deterministic Finite Automata.

$$(\epsilon+0)(0^*10)^*(\epsilon+11)$$

d) Design Push Down Automata for the following language if the language is regular. If not, then provide a proof of its irregularity.

$$A^n B^m + A^r C^p \quad \text{where } n, m, r, p > 0$$

e) Parse the following strings on the Turing machine given below and determine its language.

String 1: aabbbaaa

String 2: aabaaaa

