

## Theory of Automata (CS3005)

## Sessional-II Exam

Date: November 2<sup>nd</sup> 2024, [Saturday]

Course Instructor(s)

Ms. Sobia Tariq, Dr. Tahir Ejaz

Mr. Hamad ul Qudous, Mr. Fraz Yousaf

Total Time (Hrs.): 1

Total Marks: 25

Total Questions: 2

Roll No

Section

Student Signature

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1. Attempt all the questions.
2. Rough sheets are allowed but you are required to write solution in the provided space.

CLO 3	CLO 3	
Question 1 (10)	Question 2 (15)	Total Marks (25)

CLO #: 3 Differentiate and manipulate formal descriptions of languages, automata and grammars with focus on context-free languages using automata (PDA and NPDA).

Q1: L is a context-free Language

[10 Marks]

$L = \{x \mid x = W\#Y, \text{ where } W^R \text{ (reverse of } W) \text{ is a substring of } Y \text{ and } W, Y \in \{0,1\}^*\}$

Part-A

Give Context Free Grammar for L

Note: Use a maximum of three variables/non-terminals otherwise, ZERO marks will be awarded.

Solution:

$S \rightarrow AB$

$A \rightarrow 0A0 \mid 1A1 \mid \#B$

$B \rightarrow 0B \mid 1B \mid \epsilon$

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**Part-B**

Develop PDA for L. Also tell whether it will be DPDA or NPDA

[15 Marks]

**Solution:**