National University of Computer and Emerging Sciences

School of Computing **Fall 2018** **Islamabad Campus**

CS-301Thoery of Automata

Serial No:

Final Exam Part II

Total Time: 1 Hour

Total Marks: 30

Wednesday, Jan 2, 2019

Course Instructor(s)

Dr Waseem Shehzad, Dr Labiba Fahad, Noshina Tariq, Mehreen Alam

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Signature of Invigilator

_____ _____

Student NameRoll No Section Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Attempt on question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.
2. No additional sheet will be provided for rough work.
3. If you need more space write on the back side of the paper and clearly mark question and part number etc.
4. After asked to commence the exam, please verify that you have four **(4)** different printed pages including this title page. There are a total of three **(3)** questions.
5. Use permanent ink pens only. Any part done using soft pencil will not be marked and cannot be claimed for rechecking.

	Q-1	Q-2	Q-3	Total
Marks Obtained				
Total Marks	**10**	**10**	**10**	**30**

Vetted By: _____Vetter Signature: _____

Question 1 [10Marks]

Design a Turing machine that takes input two non-negative numbers and performs the **mod** operation on them, for example, **mod(3,7)=3 and mod(7,3)=1**. You may use the subprogram INSERT and DELETE, if needed. Clearly specify any assumptions and formats about the input and output of the TM.

Question 2 [10Marks]

For the language $\mathbf{a^n b^n c^n d^n e^n f^n}$, design a 2-stack PDA.

Question 3 [10Marks]

Let L be some language in which all the words happen to have an even length. Let us define the new language Twist(L) to be the set of all the words of L twisted, where by twisted we mean the first and second letters have been interchanged, and so on. For example, if
L = { ba abba babb ……}, the corresponding Twist(L) = { ab baab abbb ……}
Design a Post Machine that accepts Twist(L). You are **NOT** allowed to use any sub programs.