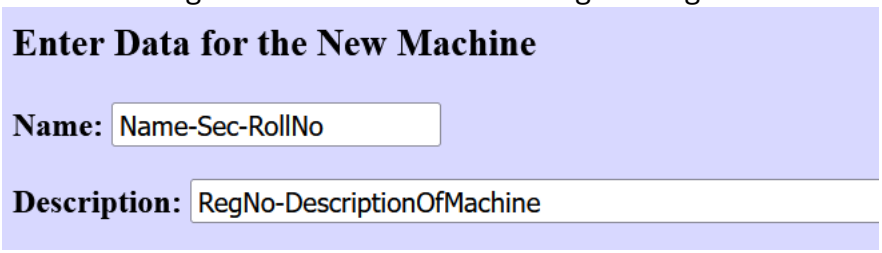
MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

Department of Computer Science & Engineering
CSE 2221: Formal Languages & Automata Theory
FISAC – 10 Marks
Submission deadline: **19 April 2023**

1. You must do this assignment individually. Plagiarism of any kind will result in 0 marks.
2. Paste the screenshots with all required data as shown in sample for Question 1.
3. Answer the question in your own words for Question 2.
4. Use the link on LMS to submit your work. (Word + Json file)

NOTE:
When creating a machine use the following naming scheme



For examples and more info https://math.hws.edu/eck/js/turing-machine/TM-info.html

Refer to the last digit in your Registration Number to choose a set for **Question 1.** (6 Marks)

Refer to the last digit in your Roll Number to choose a set for **Question 2.** (4 Marks)

QUESTION 1:

SET 0:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{WcW^r | W={a,b}*}**
Give the screenshots for the simulation of the strings **abacaba** and **abaacaabaa**

SET 1:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{n}1^n/n>=0}**
Give the screenshots for the simulation of the strings **000111** and **0000111**

SET 2:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{WxW^r | W={a,b}*,x={0,1}**
Give the screenshots for the simulation of the strings **aba0aba** and **abaa1aabaa**

SET 3:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{WW^r | W={0,1}*}**
Give the screenshots for the simulation of the strings **010010** and **0011100**

SET 4:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{n}1^m | n>=0, m>n}**
Give the screenshots for the simulation of the strings **00011111** and **000111**

SET 5:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{n}1^m | m>=0, n>m}**
Give the screenshots for the simulation of the strings **00000111** and **000111**

SET 6:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{n}1^{2n} | n>=0}**
Give the screenshots for the simulation of the strings **001111** and **00011111**

SET 7:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{2n}1^n | n>=0}**
Give the screenshots for the simulation of the strings **000011** and **0000111**

SET 8:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{n}1^{n+1} | n>=0}**
Give the screenshots for the simulation of the strings **0001111** and **000111**

SET 9:

Use https://math.hws.edu/eck/js/turing-machine/TM.html to implement a Turing Machine for the set of all string over the language given by **{0^{n+1}1^n | n>=0}**
Give the screenshots for the simulation of the strings **0000111** and **000111**

QUESTION 2:

SET 0:

Explain the concept of recursive and recursively enumerable languages as discussed in Linz Chapter 11.1, highlighting their significance.

SET 1:

Describe the characteristics of unrestricted grammars as outlined in Linz Chapter 11.2 and discuss how they differ from other types of grammars that have been covered in the course.

SET 2:

Refer to Linz Chapter 11.3 and Explain the defining properties of context-sensitive grammars and discuss their role in the Chomsky hierarchy of formal languages.

SET 3:

Discuss the significance of the Chomsky Hierarchy, as presented in Linz Chapter 11.4. Provide examples to illustrate each level of the hierarchy.

SET 4:

Refer to and explain the limitations of Turing machines in solving certain computational problems and discuss the implications of these limitations in computer science.

SET 5:

Discuss the significance of the Post Correspondence Problem (PCP) in the context of algorithmic computation. With an example show that the Post correspondence problem is undecidable.

SET 6:

Compare and contrast deterministic and nondeterministic Turing machines in terms of computational power and complexity. Discuss the advantages and limitations of nondeterministic Turing machines compared to deterministic ones.

SET 7:

Explain the concept of a universal Turing machine and its significance in computation theory. Describe how a universal Turing machine can simulate the operation of any other Turing machine.

SET 8:

Compare unrestricted grammars with context-sensitive, context-free, and regular grammars in terms of their generative power and expressive capabilities. Discuss how the Chomsky hierarchy classifies these grammars.

SET 9:

Elaborate on the Enumeration procedure with reference to universal Turing Machine. Discuss the relationship between enumeration procedures and Turing machines with respect to countability.