BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY
COMPUTER SCIENCE DEPARTMENT
FIRST SEMESTER EXAMINATIONS, FEBRUARY, 2022
300 LEVEL
CMP313 FINITE AUTOMATA THEORY
TIME ALLOWED: 2HRS
Answer ANY 3 questions

1. (a). Differentiate between Deterministic Finite Automata and Non-deterministic Finite Automata.
   (b) In relation to Finite Automata Theory give the meaning of the following terms, using relevant examples to support your answer:
   (i). Alphabet (ii). Transition Function (iii).Final State (iv). A String
   (v). Length of a string (vi). Dead state
   (c). A language, L, takes all possible strings of length 5 over alphabet {T,A,K,E,S}. List all the strings of this language.
   (d). Construct a DFA that accepts sets of all strings over $\sum = \{0,1\}$ of **length** 3.
   (20 Mks)

2. (a). What do you understand by "Regular Expressions"
   (b). Give three applications of Regular Expressions in Computing Science.
   (c). Write the regular expression for the language accepting all the strings which start with 1 and end with 0, over $\sum = \{0, 1\}$.
   (d). Write a regular expression for the set of strings that consist of alternating 0's and 1's
   (20 Mks)

3. (a) (i) Given the following transition function draw the corresponding DFA if q_3 is the final state-

Present State	Next State for Input '0'	Next State for Input '1'
q_1	q_2	q_4
q_2	q_3	q_2
q_3	q_3	q_2

   (ii). Comment briefly on state 4 (q_4) in your diagraph.
   (b). (i) Construct a DFA that accepts sets of all strings over $\sum = \{a,b\}$ that end with 'ab'.
   (ii) Give the corresponding transition table of the DFA.
   (20 Mks)

4. (a). Draw the DFA for a language L={w|w starts and ends with an ' a', w $\in$ {a,b}*}

   (b). Construct a DFA that accepts binary strings that represent numbers divisible by 4.
   (20 Mks)

5. (a). Create a DFA that accepts sets of all strings over $\sum = \{a,b\}$ that begin or end with "bbb".

   (b). Construct a DFA that accepts sets of all strings over $\sum = \{0,1\}$ that contain the substring "1010".
   (20 Mks)