"Investing in Africa's Future"

COLLEGE OF BUSINESS PEACE LEADERSHIP AND GOVERNANCE

NCSC 117 : THEORY OF COMPUTING

END OF SECOND SEMESTER EXAMINATIONS

APRIL/MAY 2022

LECTURER: Dr. Masunda

DURATION: 3 HOURS

INSTRUCTIONS

Answer **ALL** the questions

Start **each** question on a new page on your answer sheet.

The marks allocated to **each** question are shown at the end of the section.

1. Alan Turing was a
   a) Mathematician
   b) Futurist
   c) Physicist
   d) Teacher   [1]

2. What was the enigma machine designed for?   [3]

3. Give an example of a palindrome.   [1]

4. Name these operations ∩ ∪ ∘∗   [4]

5. What is the definition of a DFA and what does it do?   [4]

6. According to the 5-tuple representation i.e. FA= {Q, Σ, δ, q, F}

Statement 1: q ∈ Q'; Statement 2: F∈Q
a) Statement 1 is true, Statement 2 is false
b) Statement 1 is false, Statement 2 is true
c) Statement 1 is false, Statement 2 may be true
d) Statement 1 may be true, Statement 2 is false   [5]
7. δˆ tells us the best:
a) how the Transition function describes the DFA
b) the state is the dumping state
c) the final state has been reached
d) Kleene operation is performed on the set   [5].
   8. What are the input strings that can be extracted from this DFA?   [5]
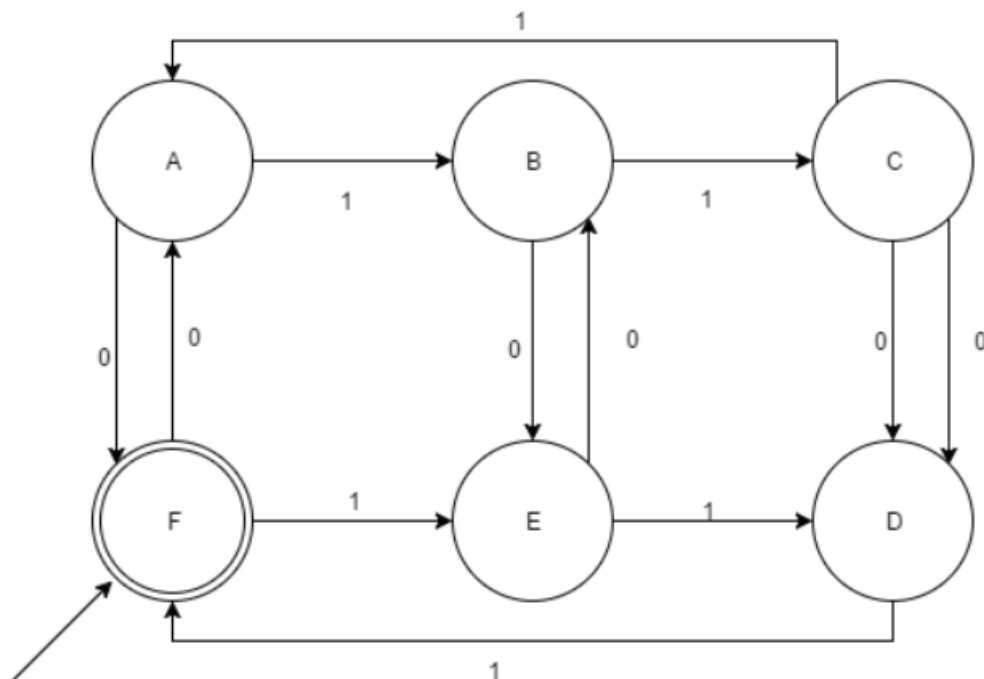
9. What are the maximum number of transition which can be performed over a state in a DFA?
$\Sigma = \{a, b, c\}$
a) 1
b) 2
c) 3
d) 4   [5]

10. What helps Push down automata to recognize context free languages?   [2]
11. Draw an NFA   [5]

12. Explain the 5 tuples of a DFA {$\mathbf{Q, \Sigma, q, F, \delta}$}   [10]
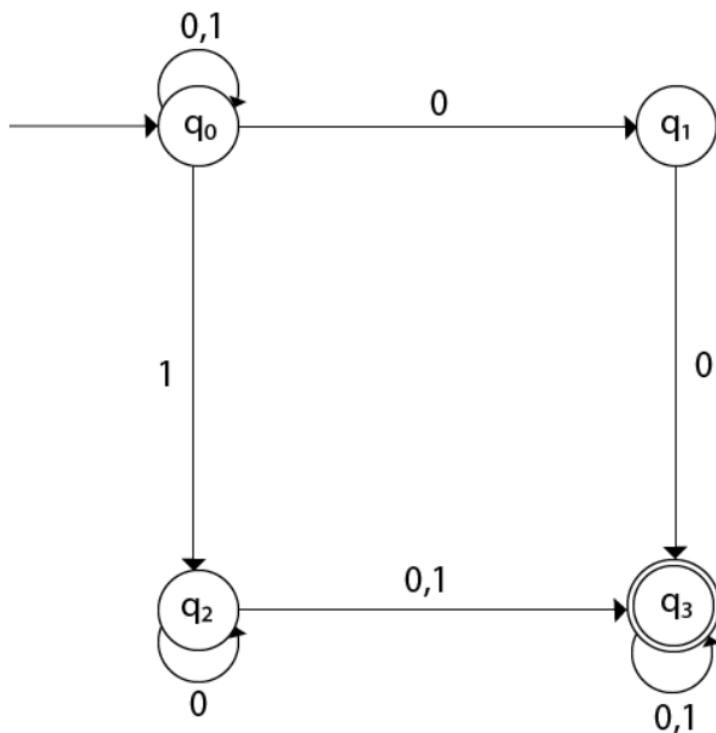13. A language recognized by a finite automaton is called a ….. Language.   [1]

14. Give a concise description of the diagram below   [5]