Mid Exam Fall 2022

CSE 2233/CSI 233: Theory of Computation/Theory of Computing
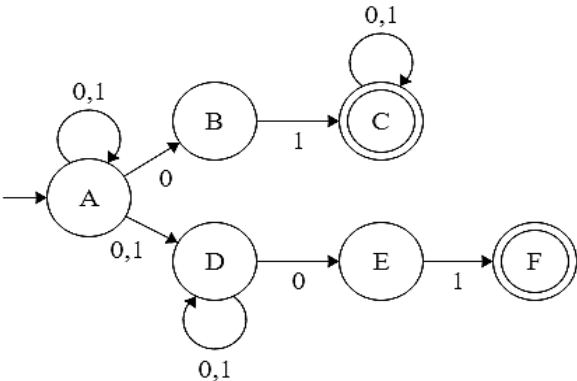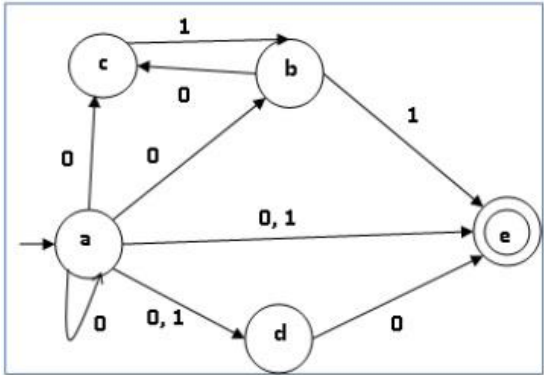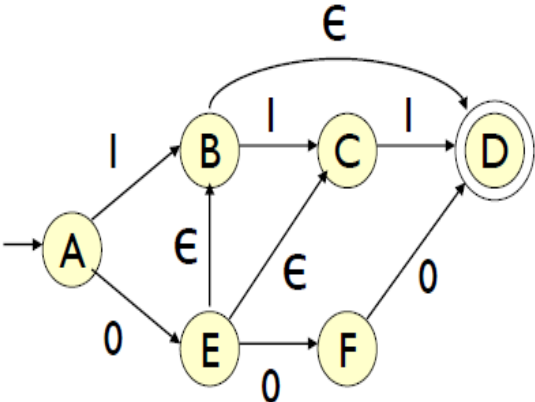Total Marks: **30**   Duration: 105 Minutes
Answer all questions. Figures are in the right-hand margin indicates full marks.
Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.

1.	Design DFAs that accepts the following languages: **a)** L = {w | w starts with 'ab' and contains 'bba' and ends with 'bb' } | Σ= {a, b} **b)** L = {w | w contains the set of all strings that has length exactly 3 and its third symbol is from the left side is 'a'} | Σ = {a, b} **c)** L = {w | w contains the set of all strings that has neither '00' nor '11' as substring} | Σ = {0, 1, 2} **d)** L = {w| w contains the set of all strings whose length always returns remainder 2 when divided by 4.} | Σ = {0, 1}	2.5 x 4
2.	Design NFAs that accepts the following languages: **a)** L= ends with 'x' and contains 'yxz' and starts with 'xy' | Σ = {x,y,z} **b)** L= starts with 'pq' or 'qr' and contains 'pqp' or 'qrr' and ends with 'qqr' | Σ = {p,q,r} **c)** L =starts with '211' *and* contains '112' or '321' *and* ends with '1' | Σ = {1, 2, 3}	3 x 3

3.	Consider the following NFA, and show with the help of NFA-tree whether the string "11010" is accepted or not.	3

4.	Convert the following NFA over alphabet $\Sigma = \{0, 1\}$ to an equivalent DFA.	4

5.	Convert the following ϵ-NFA over alphabet $\Sigma = \{0, 1\}$ to an equivalent DFA.	4