Sample Midterm

Closed <u>book</u> and <u>notes</u> **(***of paper and electronic kind***)**

Calculators are <u>not</u> allowed and all phones must be switched off

Duration: 50 minutes

Name :

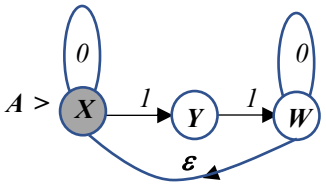
ID :

	GRADE
QUESTION 1	
QUESTION 2	
TOTAL	

Question 1 (*50* points)

(a) *(15 pts)* Write down a regular expression ***E*** corresponding to a language with a block of ***111 or 101*** separated by an arbitrary number of ***0***s from the left and the right ; and repeating itself an arbitrary number of times.

(b) *(10 pts)* Write down a *regular expression* $\boldsymbol{E_A}$ corresponding to the language accepted by the ***ε-NFA***, ***A*** below



(c) Compute: *(i) (8 pts)* an *NFA* ***B*** equivalent to ***A***, *(ii) (8 pts)* a *DFA* ***C*** equivalent to ***A*** and

(iii) (9 pts) a *minimal state DFA* ***D*** *equivalent to* ***A***.

***Question* 2** *(50 pts)*

(a) *(25 pts)* Consider the language $L = (\omega \in \{0,1\}^* \mid \omega = 0^n 1^m ;\ n+m =$ *an even number*$)$
State whether L is a *regular language* or a *non-regular context-free language*. If it is a *regular language* compute an *NFA* A that *accepts* it; if it is a *non-regular* and a *context-free language* compute a *CFG* $G = (V,T,P,S)$ that *generates* it.

(b) *(25 pts)* Repeat part ***(a)*** for $L = (\omega \in \{0,1\}^* \mid \omega = 0^n 1^m ;\ n = m+1,\ n,m$ *nonnegative integers* $)$