Q1: Build a Finite Automaton of the following: (Answer tow only) (10 mark)

1. \( a(a+b)^* \)
2. does not contain 3 consecutive 1's.
3. FA that accepts only the strings \( \text{aba} \) and \( \text{abb} \).

Q2: Find a TM that can accept the language defined by the Regular Expression \((a+b)b(a+b)^*\) (10 mark)

Q3: Convert NFA with \( \epsilon \) to NFA without \( \epsilon \)? (10 mark)

Q4: Answer the following: (10 mark)

A: Consider the following PDA (even-palindrome) trace the following word on this PDA

\((abaaba)\)

B: Design PDA for the following regular expression

\((b^*a)^+a(a+b)^*\)

Q5: Convert the following

CFG \(\rightarrow\) GNF

\(S \rightarrow aSa / bSb / Xa\)

\(X \rightarrow \lambda / b\)
Q6: TG that accepts string with an even number of $a$'s and even number of $b$'s

Apply Kleen's theorem.

Q7: A: Let $S \rightarrow (S)/ S \supset S / \sim S / p/ q$

drivied the following word

$(\sim p \supset (p \supset \sim q))$

B: Let $G$ the Grammar below

$S \rightarrow aAcBe$

$A \rightarrow Ab/b$

$B \rightarrow d$

Prove this word "abbcde" True or Fause by using bottom_up?

Good Luck