University of Engineering & Management, Kolkata

Even Semester Term - II Examination, May, 2021

Course: B-Tech(CS) **Semester: 4th**

Paper Name: Formal Language and Automata Theory

Paper Code: PCC-CS401

Full Marks: 70 **Time: 2 hours**

(Answer all the questions and each question is of 10 marks)

1. A) Find a reduced grammar equivalent to the grammar G whose productions are S → AB | CA , B → BC | AB , A → a , C → aB | b

OR

B) Reduce the following grammar to CNF: S→ASA | bA, A→B | S, B→c

2. A) Convert the grammar S→AB, A→BS | b, B→SA | a into GNF.

OR

B) Let G be S→AB, A→a, B→C | b, C→D, D→E and E→a. Eliminate unit production and get an equivalent grammar.

3. A) Let G be the grammar S→0B | 1A, A→0 | 0S | 1AA, B→1 | 1S | 0BB. For the string 00110101, find the leftmost and rightmost derivation.

OR

B) Let G=({S,A_1,A_2},{a,b},P,S) where P consist of S→a$A_1$$A_2$a, A_1→ba$A_1$$A_2$b, A_2→A_1ab,aA_1→baa,bA_2b→abab. Test whether w=baabbabaaabbaba is in L(G)

4. A) Design the PDA for $L = \{a^n b^n | n \geq 1\}$ that accepting by null store.

OR

B) Design the PDA for $L = \{wcw^T | w \in \{a, b\}^*\}$ that accepting by final state.

5. A) Eliminate the null production from the following grammar $S \rightarrow AMB; M \rightarrow aMb; M \rightarrow \varepsilon$

OR

B) What do you mean by useless symbols in CFG? Eliminate the useless symbols from the following grammar $S \rightarrow AB/a\,; A \rightarrow b$.

6. A) Show that $L = \{a^p | p\ is\ prime\}$is not CFL.

OR

B) Show that $L = \{a^{n^2} | n \geq 1\}$is not CFL.

7. A) Design a Turing machine which will accept the language L Where L = $\{a^n b^{2n} | n>=1\}$.

OR

B) Design a Turing Machine to convert 10101010 binary number into its one's complement form.