Total No. of Question : [4]　　　　　　　　**Registration No. :** ☐☐☐☐☐☐☐☐☐

Programme Name : Bachelor of Computer Science Engineering
Regular S.Y.B.Tech.Sem.IV ESE May / June 2023
IV SEMESTER (2021 BATCH)
201CSL213-Automata Theory

Duration : 2 Hours　　　　　　　　　　　　　　　　　　**Marks : 50**
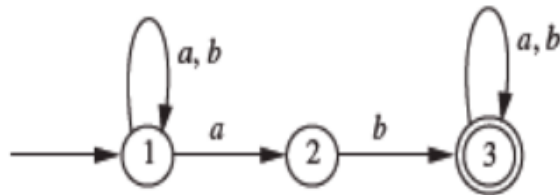**Instructions :**

(Q1) All questions are compulsory.　　　　　　　　　　　　　　　　　　[20.0]

　　(a) Design DFA for the language having strings with 010 as the substring. Write the　[6.0]
　　　　regular expression for the same.

　　　　CO :- 3
　　　　Blooms Taxonomy :- Apply

　　(b) Convert the given NFA into an equivalent DFA.　　　　　　　　　　[7.0]

　　　　CO :- 3
　　　　Blooms Taxonomy :- Apply

　　(c) Define CNF. Eliminate null productions and unit productions from the given grammar　[7.0]

$$S \rightarrow ABA \qquad A \rightarrow aA \mid \Lambda \qquad B \rightarrow bB \mid \Lambda$$

　　　　CO :- 2
　　　　Blooms Taxonomy :- Apply

(Q2) **Attempt any one question out of b and c**　　　　　　　　　　　　[10.0]

　　(a) Write a note on Top-Down and Bottom-up parsing.　　　　　　　　[4.0]

　　　　CO :- 2
　　　　Blooms Taxonomy :- Apply

　　(b) Design an NPDA for the language of palindromes, where $\sum = \{a,b\}$　[6.0]

　　　　CO :- 2
　　　　Blooms Taxonomy :- Apply

OR [b / c]

(c) Construct DPDA for the language L={ $a^n b^{n+m} a^m$, n,m>=1 } where $\sum = \{a,b\}$ [6.0]

CO :- 2
Blooms Taxonomy :- Apply

(Q3) **Attempt any one question from b and c** [10.0]

(a) State Pumping Lemma for Regular language and show that the language L={ $a^n b^n$, where n>=1} is not a regular language [3.0]

CO :- 4
Blooms Taxonomy :- Understand

(b) State all the properties of CFL. Also, show that CFLs are closed under union, concatination and closure. [7.0]

CO :- 4
Blooms Taxonomy :- Understand

OR [b / c]

(c) State Pumping Lemma for CFL and show that the language L={ $a^n b^n c^n$ | n>=1} is not a CFL. [7.0]

CO :- 4
Blooms Taxonomy :- Understand

(Q4) **Attempt any two out of three questions** [10.0]

(a) Design TM for copying a string, where $\sum = \{a,b\}$ [5.0]

CO :- 2
Blooms Taxonomy :- Apply

(b) Design TM for computing n%2. [5.0]

CO :- 2
Blooms Taxonomy :- Apply

(c) Write a note on Variants of TM. [5.0]

CO :- 1
Blooms Taxonomy :- Understand

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