SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc. Maths - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - VI

20UMAET6002 - Formal Languages and Automata Theory

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Explain types of grammars with example.
2. Construct a Regular grammar to generate the language $L = \{a^n b^m / n, m \geq 1\}$
3. Show that the family of CFL is closed under union.
4. Prove that the family of regular languages are closed under reflection.
5. State and prove Chomsky Normal form theorem.
6. Construct an ambiguous and unambiguous grammar for the language $\{a^n b^n / n=1\}$
7. Reduce the grammar to CNF $S \to aAD, A \to aB$ / bAB, $B \to b, D \to d$
8. Construct an finite automaton that accepts the language L(M), the set of strings with even number of 0's and 1's.

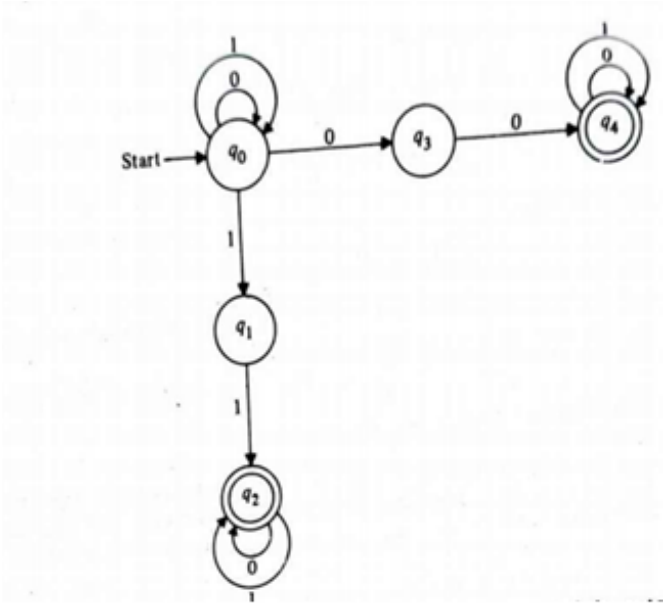
Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Construct a grammar to generate the context sensitive language
   L= $\{a^n b^m a^n b^m /$ n,m $=1\}$
10. Define star of L and show that the family of PSL, CSL, CFL and RL are closed under star.
11. Prove that for any context free grammar G there exists an equivalent context free grammar G_1 such that for each non-terminal A$\neq$S in G_1
    $L_A = \{w / A \overset{*}{\Longrightarrow} w, w \in T^*\}$ is infinite.

Contd...

12. Compute the finite Automaton of the following transition diagram. Also mention the output of the string 01001.



13. Let L be set accepted by a nondeterministic finite automaton. Then prove that there exists a deterministic finite automaton that accepts L.

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