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-2023
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. Construct context free grammar to generate the Language L=$\{a^n b^m a^m b^n / n \geq 1\}$
2. Prove that the family of CFL is closed under substitution.
3. Prove that the grammar G_1=($\{s\}$,$\{\alpha\}$,P,S) where P = {S $\rightarrow$ SS, S $\rightarrow$ a} is ambiguous
4. Construct context free grammar in Greibach normal form to generate the CFL L=$\{a^n b^n / n \geq 1\}$
5. Show that if L is accepted by an NFA with $\in$ - transitions, then L is accepted by an NFA without $\in$ - transitions.
6. Construct DFA equivalent to the NFA ($\{p,q,r,s\}$,$\{0,1\}$,δ,$\{s\}$)

	0	1
p	p,q	p
q	R	r
r	S	-
s	S	s

7. Define regular expressions and construct an NFA for the regular expression 01* + 1.
8. Explain some applications of the pumping lemma.

Section C

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

9. Define a regular Grammar and Compute a regular grammar that construct the language L= $\{\omega / \omega$ is in $\{a,b\}^+$ and ω does not contain two consecutive a's$\}$
10. Show that the families of PSL, CSL, CFL and RL are closed under union, product and star.
11. State and prove Chomsky Normal form theorem.

Contd...

12. Justify that there exists a deterministic finite automaton that accepts L, if a set accepted by a non-deterministic finite automaton.

13. Let L be the set of strings of 0's and 1's beginning with a 1, whose value treated as a binary number is a prime . Using pumping lemma prove that L is not regular.

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