அரசினர் ஆடவர் கலைக்கல்லூரி (தன்னாட்சி), நந்தனம், சென்னை – 35.

CODE: **196121** TIME: 3 Hrs

NOVEMBER 2020 MAX. MARKS: 50

PART A *(10 x 2=20)*

*Answer any **TEN** questions.*

1. What do you mean by a formal language?
2. Define finite automata
3. When a grammar is said to be right-linear?
4. When two grammars G_1 and G_2 are said to be equivalent?
5. Define the right quotient L_1 / L_2
6. State any two properties of regular language.
7. If L_1 *and* L_2 are regular languages then prove that $L_1 \cup L_2$ is a regular language
8. When a grammar is said to be context free grammar?
9. Define pushdown automata.
10. When a language **L** is said to be deterministic context free language?
11. Define phase structure grammar.
12. If $\Sigma = \{a,b\}$, then find Σ^*

PART B *(2x 5=10)*

*Answer any **TWO** questions.*

13. Construct a finite state automata that accepts all strings over {a,b} which begins with 'a' and ends with 'b'.
14. Find the language generated by the grammar $G = \{(S,A,B),(a,b),(S,P)\}$, where P is a set of production $S \to AB, S \to AA, A \to aB, A \to ab, B \to b$
15. Find the regular expression for the language $L = \{w \in [a,b)^* : n_a(w) \text{ is even and } n_b(w) \text{ is odd}\}$
16. If L_1 and L_2 are regular languages, then prove that $L_1 \cup L_2$, $L_1 \cap L_2$ and $L_1 . L_2$ are also regular languages.
17. Examine whether the following grammar G is ambiguous or not? G={N,T,S,P} where N={S,A}, T={a,b} and P consist of rules $S \to aAb, S \to abSb, S \to a, A \to bs, A \to aAAb$
18. Show that $L = \{a^n b^n : n \geq 0\}$ is a deterministic context-free language.
19. Define Regular grammar and regular language with suitable examples.
20. Construct a pushdown automata that accept the language generated by the grammar with productions

$S \to aSbb$

$S \to a$

P.T.O

PART C (2 x 10=20)

*Answer any **TWO** questions.*

21. Find the Deterministic finite automata (DFA) equivalent to Non deterministic finite state automata (NFA) for which state table is given below. Here S_2 is the accepting state .

I S	f	
	a	b
S_0	S_0, S_1	S_2
S_1	S_0	S_1
S_2	S_1	S_0, S_1

22. If L is a regular language on the alphabet Σ, then prove that their exists a right linear grammar $G = (V, \Sigma, S, P)$ such that $L = L(G)$

23. State and prove Pumping Lemma for regular language. Hence, prove that $L = \{a^n b^n : n \geq 0\}$ is not regular.

24. Explain Chomsky normal form. Check whether the given grammar is in Chomsky normal form. If not convert it into Chomsky normal form. $S \to ABa,\ A \to aab,\ B \to Ac$

25. Construct a Non deterministic pushdown automata for the language $L = \{ww^R : w \in \{a,b\}^+\}$

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