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KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR
23AM28PC402

II.B. Tech. II . Semester Regular/Supplementary Examinations, April/May- 2026
AUTOMATA THEORY AND COMPILER DESIGN
(AIML)

Time: 3 Hours

Max. Marks: 60

Note: Question paper consists of Part-A & Part-B.

- i) **Part-A** for 10M, ii) **Part-B** for 50marks
- Part A** is compulsory, consisting of 10 sub questions from all units carrying equal marks.
 - Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

PART-A (10Marks)			
Q. No	Questions	Marks	BTL
1.a)	Define finite automaton and list its components.	1M	1
1.b)	Distinguish between DFA and NFA.	1M	2
1.c)	State pumping lemma.	1M	1
1.d)	What is ambiguity in CFG?	1M	2
1.e)	Define PDA.	1M	1
1.f)	What is Turing Machine?	1M	1
1.g)	Define lexical analyzer.	1M	1
1.h)	What is token and lexeme?	1M	2
1.i)	Define syntax analysis.	1M	1
1.j)	What is three address code?	1M	2
PART-B (50Marks)			
Q.No	Questions	Marks	BTL
2. a)	Explain DFA with example and construct DFA for strings ending with "01".	5M	2
b)	Convert NFA to DFA with example.	5M	3
OR			
3. a)	Construct a DFA for the language of all strings over {0,1} that contain an even number of 0's. Explain the transitions.	5M	3
b)	Define Non-Deterministic Finite Automaton (NFA). Design an NFA for strings ending with "01" and explain its working.	5M	2
OR			
4. a)	Explain algebraic laws of Regular Expressions and evaluate any two identities with suitable examples.	5M	3
b)	Define Context-Free Grammar (CFG). Derive the string "aabb" using leftmost and rightmost derivations from the grammar (S → aSb ab)	5M	3
OR			
5. a)	Construct a Regular Expression for the language of all strings	5M	3

	over $\{0,1\}$ ending with "01" and explain the steps.		
b)	Explain the relationship between Finite Automata and Regular Expressions. Illustrate with a suitable example.	5M	2
6. a)	Explain the equivalence between PDA and Context-Free Grammar (CFG) with suitable reasoning.	5M	4
b)	Describe the formal definition of a Turing Machine and explain its working with an example.	5M	2
OR			
7. a)	Define Push Down Automaton (PDA). Explain its components and working with a suitable example.	5M	2
b)	Design a Push Down Automaton (PDA) for the language $L=\{a^n b^n n \geq 0\}$ and explain the acceptance by final state with suitable transitions.	5M	3
8. a)	Explain the structure of a compiler and describe the role of each phase with a neat diagram.	5M	2
b)	Describe lexical analysis and token recognition process.	5M	2
OR			
9. a)	Explain input buffering techniques used in lexical analysis and analyze their advantages.	5M	2
b)	Explain the basic idea of LR parsing and analyze how it differs from simple parsing techniques.	5M	3
10.a)	Define Syntax-Directed Definition (SDD). Explain synthesized and inherited attributes with examples.	5M	2
b)	Explain L-attributed SDDs and demonstrate how they are implemented in parsing.	5M	3
OR			
11.a)	Construct a syntax tree for an arithmetic expression $a+b*c$ which can be derived from the given grammar and explain its variants. $E \rightarrow E+E \mid T$ $T \rightarrow T * F \mid F$ $F \rightarrow (F) \mid id$	5M	3
b)	Explain three-address code and evaluate its importance in intermediate code generation with an example.	5M	3

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