



R22 Regulation **Subject code:4E5GA/4E5HA**
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Regular Examinations, December 2024

Automata Theory and Compiler Design
(Common to CSE(AI&ML) & CSE(DS))

Maximum Marks: 60

Date:23.12.2024

Duration: 3 hours

- Note:**
- 1.This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A		CO	Bloom Tx
All the following questions carry equal marks (10X1M=10 Marks)			
1.a)	Define DFA.	1	BTL1
b)	Write about the applications of Finite Automata.	1	BTL1
c)	What is a regular expression in theory of automata?	2	BTL1
d)	Outline about pumping lemma.	2	BTL2
e)	Label an example of undecidable problem.	3	BTL1
f)	Demonstrate Turing machine halting problem.	3	BTL2
g)	Identify the features of Lexical analyzer.	4	BTL3
h)	List out the types of LR parsers.	4	BTL4
i)	Construct three-address code generation.	5	BTL3
j)	Distinguish stack allocation of space.	5	BTL4
Part-B			
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
2	a) Compare DFA and NFA. [5M]	1	BTL2
	b) Construct a DFA for the Regular Language consisting of any number of a's and b's. [5M]	1	BTL3
OR			
3	a) Design DFA which accepts language even number of 0's and even number of 1's. [5M]	1	BTL3
	b) Explain the procedure for constructing minimum state DFA with an example. [5M]	1	BTL2
4	a) Show that $L = \{a^p/p\}$ is regular or not. [5M]	2	BTL2
	b) Define Context Free Grammar. State and explain the closure properties of CFG. [5M]	2	BTL1
OR			
5	a) Show that $L = \{a^{2n}/n < 0\}$ is regular. [5M]	2	BTL1
	b) Illustrate Ambiguous Grammar? Check whether the grammar $S \rightarrow aAB$, $A \rightarrow bC/cd$, $C \rightarrow cd$, $B \rightarrow c/d$ Is Ambiguous or not? [5M]	2	BTL2

6	a) Model a Turing Machine for language $L = \{0^n 1^n 2^n \mid n \geq 1\}$. [5M]	3	BTL3
	b) Given: $S \rightarrow aABB aAA$, $A \rightarrow aBB a$, $B \rightarrow bBB A$, construct the PDA that accepts the language generated by given grammar. [5M]	3	BTL1
	OR		
7	a) Summarize Push Down Automata? Draw and explain a deterministic PDA for accepting $\{a^n b^n \mid n > 1\}$ [5M]	3	BTL2
	b) Explain with neat diagram the working of Turing machine and the types of Turing machines. [5M]	3	BTL5
8	a) Estimate Right most derivation for the grammar $E \rightarrow E+T/T$, $T \rightarrow T*F/F$, $F \rightarrow (E)/id$ for $w = id+id*id$. [5M]	4	BTL5
	b) Find FIRST and FOLLOW sets for the following grammar: [5M] $E \rightarrow TE'$ $E' \rightarrow +TE' \mid \epsilon$ $T \rightarrow FT'$ $T' \rightarrow *FT' \mid \epsilon$ $F \rightarrow (E) \mid id$	4	BTL1
	OR		
9	Explain the detail about the phases of the compiler. [10M]	4	BTL3
10	a) Identify Synthesized and Inherited attributes. [5M]	5	BTL3
	b) Illustrate and design (i) the Syntax Tree (ii) The Parse Tree (iii) Annotated Tree with an input string $5*6+7$; [5M]	5	BTL3
	OR		
11	a) Build Three-address code and its quadruple, triple representation for the assignment: $a=b*-c+b*-c$. [5M]	5	BTL2
	b) Interpret the advantages and disadvantages of heap storage allocation strategy. [5M]	5	BTL3