



Regulation: R18

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

Subject Code: 2P5EC

B.Tech V Semester Supplementary Examinations, January 2023

Theory of Computation

(CSE)

Maximum Marks: 70

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 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

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 List out the Finite automata?
- 2 What is an Automata?
- 3 Define Regular Expression.
- 4 Define Pumping Lemma
- 5 List the properties of TYPE 3 grammar
- 6 Define UNIT Production?
- 7 Define Chomsky Normal Form.
- 8 Define the Language of Turing Machine.
- 9 What are the components of a Turing machine?
- 10 Define NP-complete problems.

Part-B

Answer All the following questions.

(5 X 10M=50Marks)

- 11 A. Explain the finite state machine with a block diagram.
B. Construct DFA to accept the language of all strings of even numbers of a's & numbers of b's divisible by three over $(a+b)^*$.
[5+5]
OR
- 12 A. Explain the procedure to convert NFA to DFA with an example.
B. Construct DFA to accept set of all strings defined over alphabet $\{0,1\}$ ending with substring '010'.
[5+5]
- 13 A. Construct the FA for the Regular Expression $(a|b)^*abb$.
B. List out the properties of regular sets?
[5+5]
OR
- 14 A. Convert the Regular Expression $\{01^* + 1\}$ to Finite Automata.
B. Discuss closure properties of RE's
[5+5]
- 15 A. Construct PDA for the language $L = \{WW^r \mid \text{where } W \in (a+b)^*, W^r \text{ is reverse of } W\}$.
B. Construct PDA for the given CFG: $S \rightarrow aSb, S \rightarrow ab$, Where S is the only variable and $\{a,b\}$ are terminals.
[5+5]
OR
- 16 Discuss the Pumping lemma for Context Free Languages with example $\{a^n b^n c^n \mid n > 0\}$ [10]

- 17 A. Convert the following grammar to Greibach Normal Form
 $S \rightarrow ABA \mid AB \mid BA \mid AA \mid B$
 $A \rightarrow aA \mid a$
 $B \rightarrow bB \mid b$
 B. Convert the following Context Free Grammar into Chomsky Normal Form $S \rightarrow aaaaS \mid aaaa$
 [5+5]
- OR
- 18 A. Design a TM to accept the language $L = \{w c w^R \mid w \in (a+b)^*\}$.
 B. Design a TM to recognize all strings consisting of odd number of 1's. [5+5]
- 19 A. Give definitions of P and NP problems.
 B. Explain TM halting problem. [5+5]
- OR
- 20 A. Explain Chomsky's hierarchy of languages?
 B. What is post correspondence problem? Verify whether the following PCP has solution or not? $A = \{ba, ab, a, baa, b\}$, $B = \{bab, baa, ba, a, aba\}$ [5+5]