

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET - B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2023**

Semester : Semester III - 2021

Course Code : CSE2018

Course Name : Sem III - CSE2018 - Theory of Computation

Program : B.Tech. CSE/ISE/IST/ISD/ISR

Date : 19-JAN-2023

Time : 1.00PM - 4.00PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE TEN QUESTIONS

10 X 2 = 20M

1. What is language recognizer?
(CO1) [Knowledge]
2. Write any FOUR applications of Finite Automata.
(CO1) [Knowledge]
3. What is epsilon closure? write with example.
(CO2) [Knowledge]
4. Define non-deterministic automata with example.
(CO2) [Knowledge]
5. Write a regular expression for language with strings having odd number of 0's over input {0, 1}.
(CO3) [Knowledge]
6. Write regular expression for a $L = \{ a^n b^n, n \geq 1 \}$
(CO3) [Knowledge]
7. Define NPDA with all tuples.
(CO4) [Knowledge]
8. Transition function in PDA depends upon.-----
(CO4) [Knowledge]
9. Write TM transition function for write operation on tape.
(CO5) [Knowledge]

10. Define Tape with example.

(CO5) [Knowledge]

PART B

ANSWER ALL THE FIVE QUESTIONS

5 X 10 = 50M

11. Define DFA. Construct a DFA accepting the language $L = \{w0100w \mid w \text{ belongs to } (0+1)^*\}$.

(CO2) [Comprehension]

12. Convert the given NFA to DFA.



(CO2) [Comprehension]

13. Write the Pumping Lemma theorem and Using pumping Lemma prove that the language $L = \{VV^R \mid V \text{ belongs to } \Sigma^* = \{a,b\}^*\}$.

(CO3) [Comprehension]

14. Construct left-most and right-most derivation trees for the string aaabbabbba using the grammar $S \rightarrow aB \mid bA$; $A \rightarrow a|aS|bAA$; $B \rightarrow b|bS|aBB$. Discuss about ambiguity of this grammar?

(CO3) [Comprehension]

15. Design a push down automata for a language $L(G) = \{a^n b^n, n \geq 1\}$

(CO4) [Comprehension]

PART C

ANSWER ALL THE TWO QUESTIONS

2 X 15 = 30M

16. Define Push Down Automata. Design a PDA for the language $L = \{ ww^R, w \in \{a,b\}^* \}$.

Write Transition Diagram, Transition Table, PDA Tuples, extended transition function for sample acceptance string, and sample rejection string.

(CO4) [Application]

17. Define TM. Construct a Turing Machine for the language $L = \{ 0^n 1^n, n \geq 1 \}$.

(CO5) [Application]