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**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester IV - 2021

Course Code : CSE2018

Course Name : Sem IV - CSE2018 - Theory of Computation

Program : B.Tech - All Programs

Date : 14-JUN-2023

Time : 9.30AM - 12.30PM

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 QUESTIONS

(5 X 2 = 10M)

1. Obtain a regular expression for the language

$$L(M) = \{a^n b^m \mid m \geq 1, n \geq 1, nm \geq 3\}$$

(CO3) [Knowledge]

2. Show how to obtain a regular expression representing strings of a's and b's having odd length.

(CO3) [Knowledge]

3. Define Derivation Tree, give an example.

(CO3) [Knowledge]

4. What are the conventional notations of Push Down Automata?

(CO4) [Knowledge]

5. Describe the Turing Machine. What are the distinguishing qualities does TM have?

(CO5) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

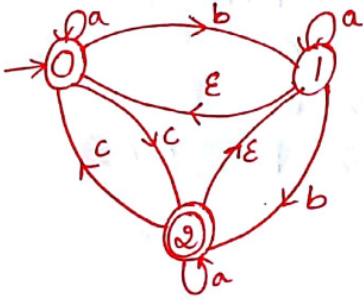
(5 X 10 = 50M)

6. Design a PDA to accept the language by empty stack method.

$$L(M) = \{w c w^R \mid w \in (a \cup b)^*\}$$

(CO4) [Comprehension]

7. Convert the given *enfa* in to its equivalent DFA and also find the *eclosure* for all states.



(CO2) [Comprehension]

8. Construct a DFA to accept language

$$L(M) = \{w : n_a(w) \bmod 3 \neq 0\} \text{ on } \Sigma = \{a, b\}$$

(CO2) [Comprehension]

9. Prove that $L = \{w | n_a(w) < n_b(w)\}$ is not regular.

(CO3) [Comprehension]

10. Construct a grammer to generate a language consisting of all non palindrome over the alphabet $\{a, b\}$.

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 20 = 40M)

11. Design a Turing Machine for language $L(M) = \{1^n 2^n | n \geq 1\}$, show that whether the string "1122" is accepted by ID.

(CO5) [Application]

12. a. Construct a PDA that accepts the language $L(M) = \{0^n 1^{2n} | n > 0\}$, show that whether the string 001111 is accepted by machine or not.

b. Construct a PDA that accepts the language $L(M) = \{(0,1)^* C (0,1)^*\}$, design a PDA with final state, show whether the string 0101C1010 is accepted by machine or not.

(CO4) [Application]