Name: ....

Reg.No: ....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19PCSS1C03 - THEORY OF COMPUTATION

(Computer Science)

(2019 Admission onwards)

Time : 3 Hours

Maximum : 30 Weightage

Part-A

Answer any *four* questions. Each question carries 2 weightage.

1. Prove $1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = (n(2n-1)(2n+1))/3$ using proof by induction?

2. Describe Epsilon NFA with example.

3. Show how to construct regular grammar for a given dfa with example?

4. Design PDA for $0^N 1^{2N}$.

5. Explain elimination of null productions with example.

6. Explain linear bounded automata.

7. Explain Turing acceptable and Turing enumerable languages.

(4 × 2 = 8 Weightage)

Part-B

Answer any *four* questions. Each question carries 3 weightage.

8. Design a DFA accepting 1. substring with 0101 2. number of zeros divisible by 5.

9. Explain any 5 closure properties of regular sets.

10. Explain the procedure of DFA State Minimisation.

11. State and proove Pumping lemma for context free languages.

12. Explain Chomsky's hierarchy.

13. Explain in brief decidability and undecidability in Turing Machine with example.

14. Explain in detail about Reductions.

(4 × 3 = 12 Weightage)

Part-C

Answer any *two* questions. Each question carries 5 weightage.

15. Explain Conversion of Non-Deterministic into deterministic Finite Automata. Construct a nondeterministic finite automaton accepting the set of all strings over {a, b} ending in abba. Use it to construct a DFA accepting the same set of strings.

16. Explain with example.
    (a) Equivalence of two finite automata.
    (b) Equivalence of two regular expression.

17. Design a turing machine accepting 1. wwR wϵ (a+b)* 2.an bn

18. Explain Cook's Theorem.

(2 × 5 = 10 Weightage)

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