20P164 (Pages: 2) Name: ....……

Reg. No……...

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS-PG)

(Regular/Supplementary/Improvement)

CC19P CSS1 C03 - THEORY OF COMPUTATION

(Computer Science)

(2019 Admission onwards)

Time: Three Hours Maximum: 30 Weightage

PART A

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

1. What is undecidable problem? Also prove that halting problem is undecidable.
2. What do you mean by regular expression? Construct a finite automation for the regular expression $(a / b)^*$ abb.
3. Construct a Turing machine for the language $L=\{a^n b^n c^n : n \geq 1\}$
4. Write a note on time and space bounded simulations.
5. Differentiate ambiguous and unambiguous grammar. Prove that the given grammar is ambiguous and also find an unambiguous grammar for it.

   $E \rightarrow E + E / E * E / (E) / id.$
6. Illustrate the equivalence between PDA and CFL with example.
7. Explain the equivalence of finite automata with and without ϵ-moves.

(4 x 2 = 8 Weightage)

PART B

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

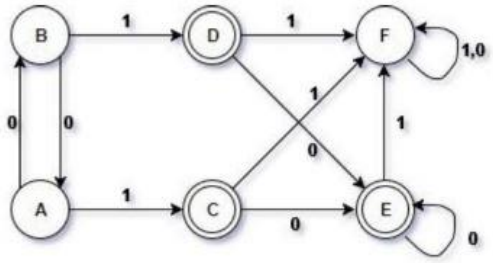
8. Explain CYK algorithm with example.
9. Describe the concept of Turing machine as language accepters and transducers.
10. Discuss the complexity classes P, NP and NP completeness with examples.
11. Explain pumping lemma and proof of existence of non-regular languages.
12. Write about multi tape, multidimensional and universal Turing machine in detail.
13. Explain the closure properties of CFL.
14. Explain:
    a) Regular Grammar.
    b) Sentence and sentential forms.
    c) Star closure and positive closure of a language.

(4 x 3 = 12 Weightage)

PART C

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

15. Explain the algorithm for DFA state minimization and minimize the given DFA.



16. State and prove Cook's theorem.

17. Describe:

    a) Myhill-Nerode theorem.

    b) Concept of mathematical induction.

18. Compare and contrast recursive and recursively enumerable languages.

(2 x 5 = 10 Weightage)

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