

D 93397

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Name.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS)

Computer Science

CSS 1C 03—THEORY OF COMPUTATION

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

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

1. Define Alphabets, Strings and Languages.
2. Draw a DFA which accepts strings of the form $abc^*a(bc)^*a$.
3. Define regular expression. Write regular expression for all strings over $\{0, 1\}$ ending in '11' and contain at least one '0'.
4. Explain the Classes P and NP.
5. Define Push Down Automata.
6. Define context sensitive Languages.
7. Explain Multi-tape Turing machine.

(4 × 2 = 8 weightage)

Turn over

Section B

Answer any **four** questions.

Each question carries 3 weightage.

8. Design NFA and DFA which recognizes the language over $\{a - z\}$ and accepts the strings ending in 's' or 'ed' or 'ing'.
9. Prove that every language defined by a regular expression is also defined by a Finite Automation.
10. Explain the following closure properties of regular languages :
Closure under complementation, Union and Intersection.
11. Explain "Satisfiability Problem".
12. Write a note on Halting problem.
13. List and explain closure properties of Context Free Languages.
14. Comment on the Equivalence of Type 0 grammar with Turing Machines.

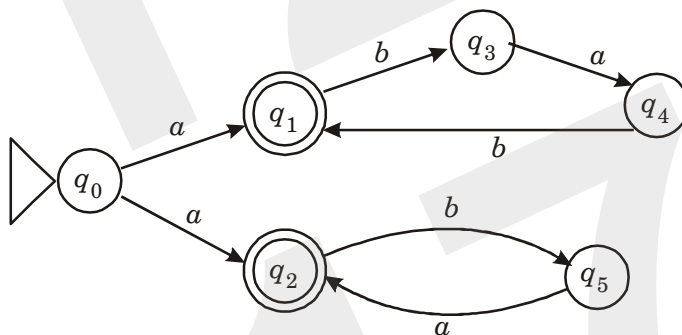
(4 × 3 = 12 weightage)

Section C

Answer any **two** questions.

Each question carries 5 weightage.

15. Illustrate NFA to DFA conversion using the following example :



16. Illustrate DFA state minimization with suitable example.

17. Define CNF and GNF. Give examples. Perform the following, in the order given, on the following grammar :

Eliminate ϵ productions, eliminate any unit productions, Eliminate useless symbols and put the resulting Grammar into Chomsky Normal Form :

$$S \rightarrow 0A0 \mid 1B1 \mid BB$$

$$A \rightarrow C$$

$$B \rightarrow S \mid A$$

$$C \rightarrow S \mid \epsilon$$

18. Define Turing Machine and Language of a Turing machine. Explain Instantaneous Descriptions and transition diagrams for Turing Machines with suitable examples.

(2 × 5 = 10 weightage)