D 93397 (Pages : 3) 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.

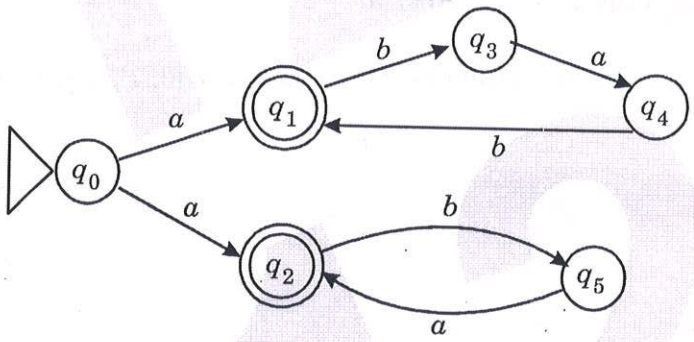
14. Comment on the Equivalence of Type 0 grammar with Turing Machines.

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

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

$A \rightarrow C$

$B \rightarrow S \mid A$

$C \rightarrow S \mid \varepsilon$

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)