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Name.....

Reg. No.....

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, NOVEMBER 2021**

(CBCSS)

Computer Science

CSS 1C 03—THEORY OF COMPUTATION

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

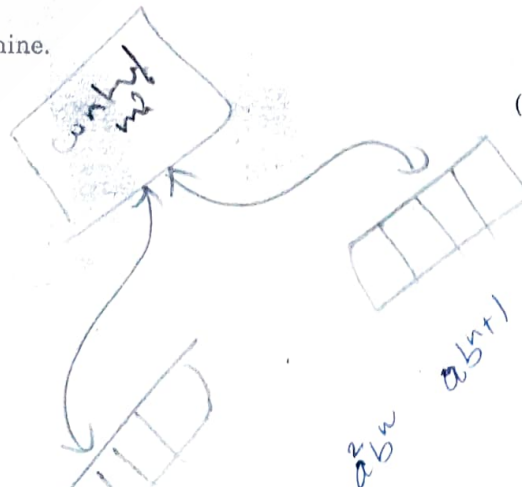
1. In cases where choices are provided, students can attend **all** questions in each section.
2. The minimum number of questions to be attended from the Section / Part shall remain the same.
3. The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.
4. 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 Regular language with suitable example.
2. List down the Closure properties of regular language.
3. Discuss CFG with one example.
4. State the uses of Turing decidable language classes.
5. Recite Cook's theorem.
6. Write the language generated by the regular expression $ab^*(a + b)$ and construct a DFA for the same.
7. Define Multi-tape Turing machine.

(4 × 2 = 8 weightage)

**Turn over**

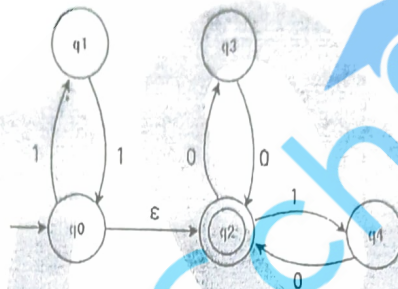
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Section B

Answer any four questions.

Each question carries 3 weightage.

8. Construct a NFA and DFA for the language over $\{0, 1\}$, that will accept all the strings ending with 1.
9. With the help of Myhill Nerode theorem prove that $L = \{a^n b^n \mid n \geq 0\}$ is not regular.
10. State and explain CYK algorithm.
11. Illustrate how decidability problem is solved using Turing machine.
12. Explain the post correspondence problem in TOC.
13. Convert the following epsilon-NFA to NFA.



14. Discuss DCFL's and their properties.

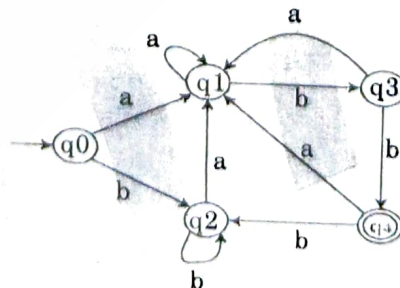
(4 × 3 = 12 weightage)

Section C

Answer any two questions.

Each question carries 5 weightage.

15. Compare and contrast DFA and NFA.
16. a) Write a note on Equivalence theorem.
b) Minimize the following DFA using equivalence theorem.



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17. Explain with an example the equivalence of LBA and Context Sensitive Grammar.
18. Outline Chomsky hierarchy of grammar. Give examples for each.

(2 × 5 = 10 weightage)