

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022
(Regular/Improvement/Supplementary)

COMPUTER SCIENCE
FCSS1C03 – THEORY OF COMPUTATION

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *four* questions. Each carries *two* weightage.

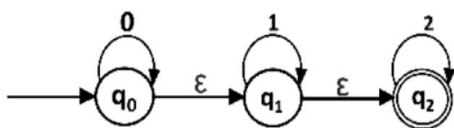
1. Convert the following CFG into GNF.

$$S \rightarrow AB$$

$$A \rightarrow BS/b$$

$$B \rightarrow SA/a$$

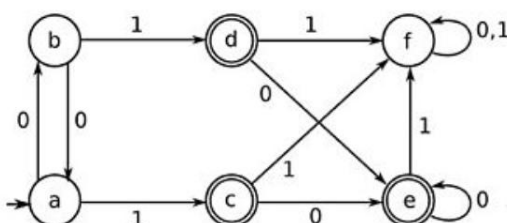
2. What are undecidable problems? Discuss the undecidability of halting problem of Turing Machine.
3. Recite the church thesis.
4. Differentiate between multiheaded and multitape Turing Machine.
5. What is a Regular Expression? Write a Regular Expression and DFA for set of strings that consist of alternating 0's and 1's.
6. Differentiate between sentential form and sentence?
7. Convert the following ϵ NFA to NFA.



(4 × 2 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage

8. Minimize the given DFA.



(P.T.O.)

9. Explain the closure properties of recursively enumerable languages.
10. Write a note on NP-Complete problems of Polynomial Time Reductions.
11. Describe the closure properties of Regular Language.
12. Explain Halting problem? Is it solvable or unsolvable problem? Discuss.
13. Discuss Myhill-Nerode Theorem with an example.
14. What are normal forms? Explain briefly the advantages of having a normal form for a grammar?

(4 × 3 = 12 weightage)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

15. Construct ϵNFA for the regular expression $10+(0+11)0^*1$. Also convert it to its equivalent DFA using subset construction method.
16. State and Prove Cook's Theorem.
17. Explain Pumping Lemma for Context Free Language.
18. Give an outline of Chomsky hierarchy of languages.

(2 × 5 = 10 weightage)