D1ACS2103 **(2 Pages)** **Name.....**
Reg.No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021
(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. Explain Myhill-Nerode theorem.
2. Compare and contrast recursive and recursively enumerable languages.
3. Discuss the complexity classes P and NP with examples.
4. Explain pumping lemma and proof of existence of non-context free languages with suitable example.
5. Explain the concept of proof by mathematical induction and prove:
   1+2+3+……+n= n (n+1)/2.
6. Show the equivalence of NFA with and without epsilon moves.
7. Write a note on regular grammars with example.

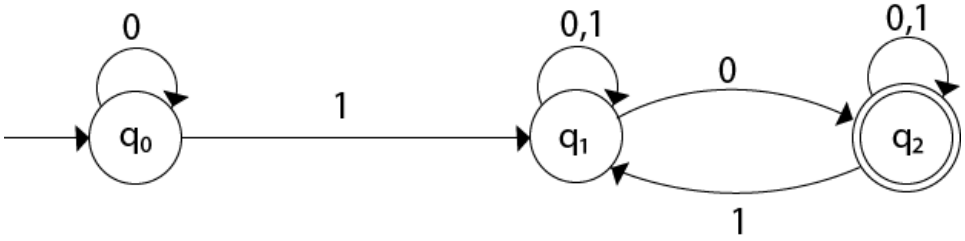
(4 × 2 = 8 weightage)

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

8. Using CYK algorithm, determine whether the string w=aabbb is in the language generated by the grammar:
   S → AB
   A → BB / a
   B →AB / b
9. Explain Chomsky classification of languages in detail.
10. Define NP complete language. Show that satisfiability problem is NP complete.
11. Construct a Turing machine that accepts the language $L=\{a^nb^n: n \geq 0\}$. Also derive the computation sequence for the input sequence w=aabb.

(P.T.O.)

12. State the algorithm for NFA to DFA conversion and convert the given NFA to DFA.



13. What is Chomsky Normal Form? Convert the given grammar into CNF.

S → abAB

A → bAB / λ

B → BAa /A / λ

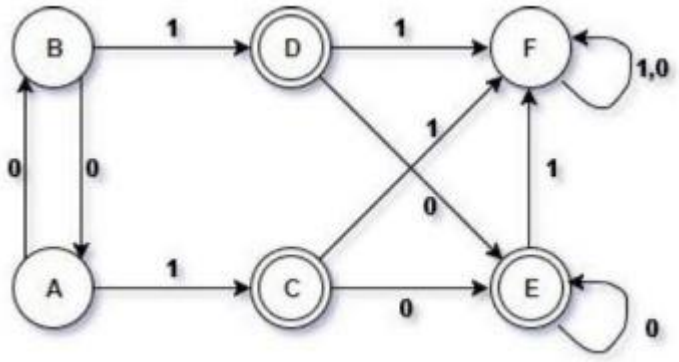
14. Discuss the closure properties of regular languages in detail.

(4 × 3 = 12 weightage)

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

15. What is Turing machine? Explain different models of Turing machine in detail.

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



17. What is undecidable problem?Briefly explain different undecidable problems.

18. Let L be a CFG. Show that there exists a PDA, M such that L=L(M).

(2 × 5 = 10 weightage)