62454

Reg. No.

I Semester MCA Degree Examination, July - 2022
COMPUTER SCIENCE
Theory of Computation
(CBCS Y2k20 Scheme)
Paper : 1MCA4

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates:

1) Answer any **FIVE** questions from **Part - A**.
2) Answer any **FOUR** full questions from **Part - B**

PART - A

Answer any **FIVE** questions.   (5×6=30)

1. Define DFA ad NFA. Explain differences between NFA ad DFA.   (6)

2. What is Regular expression? Prove that regular languages are closure under intersection? (6)

3. Define deterministic Push down Automata. Explain with example.   (6)

4. Explain different types of Turing machines.   (6)

5. Design a DFA to accept binary strings divisible by 3. and verify '1010' string is accepted or rejected.   (6)

6. Explain chomsky's hierarchy of languages.   (6)

7. Prove that complement of recursively enumerable language in recursive.   (6)

8. Eleminate unit productions from the grammer: (6)

   $S \rightarrow Aa / B / Ca$

   $B \rightarrow aB / b$

   $C \rightarrow Db / D$
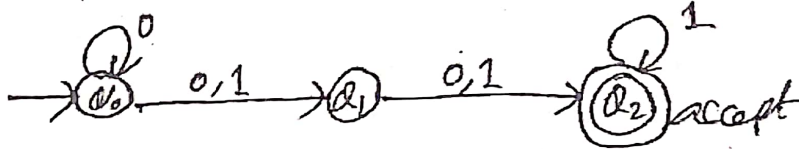
   $D \rightarrow E / d$

   $E \rightarrow ab$

[P.T.O.

PART - B

Answer any FOUR full questions. (4×10=40)

9. a) Convert the following NFA to its equivalent DFA: (7)

   b) Explain the applications of finite Automata. (3)

10. a) Show that $L = \{a^i b^j / i > J\}$ is not regular, where L is a Language. (5)
    b) Convert the following CFG into CNF : (5)
    $S \rightarrow OA / 1B$
    $A \rightarrow OAA / 1S / 1$
    $B \rightarrow 1BB / 0S / 0$

11. a) Obtain a PDA to accept the language $L(m) = \{ W C W^R / WE (a + b)^*\}$ where W^R is reverse of W by a final state and also verify the string 'aabc baa' is accepted or not.(7)
    b) Discuss the difference between moore machine and mealy machine. (3)

12. a) Design a Turing machine to accept the language $L = \{0^n 1^n / n \geq 1\}$ and verify the string $W = 0011$ is accepted or rejected. (7)
    b) Write a short note on Holting problem in TM. (3)

13. a) Define Derivation Tree. Explain left most derivation tree ad Right most derivation tree. (4)
    b) Show that the following grammar is ambigious. (6)
    $S \rightarrow aB / bA$
    $A \rightarrow aS / bAA / a$
    $B \rightarrow bS / aBB / b$
    on a string 'aabbab'?

14. Write a short note on:
    a) Universal languages. (5)
    b) Decision properties of Regular languages. (5)