Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

MCA (Sem.–3)

THEORY OF COMPUTATION

Subject Code : PGCA 1927

M.Code : 90800

Date of Examination : 21-12-22

Time : 3 Hrs. **Max. Marks : 70**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying TEN marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

l. Write short notes on :

a) CFG.

b) Explain tractable problems with example

c) How will explain Russels's paradox?

d) Discuss about Moore machine.

e) Differentiate PDA and NPDA.

f) Explain steps for simplification of CFG.

g) Define halting problem.

h) What is the unrestricted grammar?

i) How to perform lexical analysis?

j) Explain the parse tree representation.

SECTION-B

2. Explain DFA. Construct finite automata equivalent to the following regular expressions (step by step): ((0+1) (0+1))* + ((0+1) (0+1) (0+1))*

3. Explain Pumping Lemma. Prove that the language L = {w $\in$ {*a, b*}* | $w = w^R$} is not regular grammar.

4. What is CNF? Convert the following grammars to Chomsky Normal Form:

   S $\rightarrow$ ASB, A $\rightarrow$ aASA | a | ε, B $\rightarrow$ SbS | A | bb

5. Explain Regular grammar. Consider the language L = {w $\in$ (*a, b*)* : w has an odd number of a's}, Write a regular grammar for L. Use that grammar to derive a (possibly non-deterministic) FSA to accept L.

SECTION-C

6. What is the significance of turing machine? Design and explain step by step Turing Machine for computing ‘‘Concatenate two strings w_1 and w_2, where each string is generated over {1, b}"

7. What is ambiguity in PDA? Write the Instantaneous descriptions and design PDA which recognizes the set of strings over {*a, b*} where string length is odd and its middle symbol is a ‘b’.

8. What is Post Correspondence Problem? How reduction works in the structure of undecidability proof? Design an instance and match of PCP to explore that the lists

   M = (ab, bab, bbaaa) and N = (a, ba, bab) include a Post Correspondence Solution?

9. Write short notes on the list given below:

   a) Chomsky Hierarchy of languages

   b) CSL.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.