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# F- 542

## M.Sc. (Computer Science)
## (Second Semester)
## EXAMINATION, May - June, 2022
### Paper Fourth
### FORMAL AUTOMATA THEORY

*Time : Three Hours]* [*Maximum. Marks:100*

**Note: Attempt all sections as directed.**

### Section - A

### (Objective/Multiple Type Questions)

**(1 mark each)**

**Note : Attempt all questions. Choose the correct answer.**

1. Which of the technique can be use to prove that a language is non regular?

    (A) Pumping Lemma

    (B) Ardent Theorem

    (C) Ogden's Lemma

    (D) Regular Lemma

2. Which of the following are related to tree Automation :

    (A) State machine

    (B) Myphill Nerode T

    (C) Courcelle's Theorem

    (D) All of the mentioned

3. The entity which generate Language is termed as:

    (A) Automata

    (B) Tokens

    (C) Grammar

    (D) Data

4. Are ambiguous grammar context free?

    (A) Yes

    (B) No

    (C) Some

    (D) Something

5. Which of the following is not a notion of context free grammars.

    (A) Recursive inference

    (B) Derivations

    (C) Sentential forms

    (D) All of the mentioned

6. The language accepted by push down automation-

   (A) Recursive language

   (B) Context free language

   (C) Linearly Bounded language

   (D) All of the mentioned

7. State true or false: Statement: Every right-linear grammar generates a regular language:

   (A) True

   (B) False

   (C) Some

   (D) Somethings

8. Which of the following languages are most suitable to implement context free languages.

   (A) C

   (B) Perl

   (C) Assembly Language

   (D) None of the mentioned

9. The most suitable data structure used to represent the derivations in compiler-

   (A) Queue

   (B) Linked List

   (C) Tree

   (D) Hash Tables

10. In which order are the children of any node ordered?

    (A) From the left

    (B) From the right

    (C) Arbitrarily

    (D) None of the mentioned

11. A grammar with more than one parse tree is called:

    (A) Ambiguous

    (B) Unambiguous

    (C) Regular

    (D) None of the mentioned

12. _____is the acyclic graphical representation of a grammar:

    (A) Binary tree

    (B) Oct tree

    (C) Parse tree

    (D) None of the mentioned

13. Grammar is checked by which component of compiler?

    (A) Parser

    (B) Scanner

    (C) Semantic Analyzer

    (D) None of the Mentioned

14. Statement true or false: Statement: A CNF parse tree's string yield (W) can no longer be 2h - 1.

   (A)  True

   (B)  False

   (C)  Some

   (D)  Anyway

15. Which of the following is false for a grammar G in Chomsky normal form:

   (A)  G has no useless symbols

   (B)  G has no unit productions

   (C)  G has no epsilon productions

   (D)  None of the mentioned

16. Left corner parsing method of uses which of the following?

   (A)  Top - down parser

   (B)  Bottom up parser

   (C)  Top - Down and Bottom up parser

   (D)  Only parser

17. Which of the following parser perform top - down parsing?

   (A)  LALR parser

   (B)  L L parser

   (C)  Recursive accent parser

   (D)  None of the mentioned

18. XML is a_____markup language-

   (A)  Meta

   (B)  Beta

   (C)  Octa

   (D)  Peta

19. Which of the following are distinct to parse trees?

   (A)  Abstract parse trees

   (B)  Sentence diagrams

   (C)  Both abstract parse trees and sentence diagram

   (D)  None of the mentioned

20. The finite automata accept the following languages-

   (A)  Regular Languages

   (B)  Context free Languages

   (C)  Context sensitive Languages

   (D)  All the mentioned

### Section - B

**(Very Short Answer Type Questions)**

**(2 marks each)**

**Note : Attempt all questions.**

1.  Define DFA.

2.  Write about the applications of finite Automata.

3. Define push down automata.

4. What is the purpose of studding Turing machine?

5. Define the concept of Automata theory.

6. Define ambiguity in CFG with an example.

7. Define pushdown automation.

8. Define context free grammar.

9. Define Chomsky Normal Form.

10. Define NP - complete problem.

## Section - C

### (Short Answer Type Questions)

**(3 marks each)**

**Note: Attempt all questions.**

1. Define Non-deterministic finite Automata.

2. What is the regular grammar? Explain conversion of finite Automata to regular expressions.

3. Design a DFA which accepts set of all strings which alphabet.

4. Differentiate between NFA and DFA.

5. Construct a regular grammar for $L = \{O^n 11 / n >= 1\}$.

6. Give an example of un-decidable problem.

7. Write about the programming techniques for Turing machines.

8. Explain the application of the pumping lemma.

9. Explain Moore machine.

10. Explain linear bounded automata and context sensitive language.

## Section - D

### (Long Answer Type Questions)

**(6 marks each)**

**Note: Attempt any five questions.**

1. Explain the process used to convert a non - deterministic Automata to deterministic Automata.

2. Write the steps convert regular expression (01* + 1) to finite automata.

3. Explain pumping lemma for the language $L = \{a^n / n \ is \ prime\}$ and prove that it is not regular.

4. Construct a DFA accepting the set of all strings ending with OO.

5. Construct the Moore machine to determine reside mod 3 and convert into mealy machine.

6. Write the importance of NP - complete problem.

7. Write the comparison between linear bounded automata and context sensitive language.