S.No. 18535 P 16 MAE 3 C

(For candidates admitted from 2016–2017 onwards)

M.Sc. DEGREE EXAMINATION, APRIL 2021

Mathematics

AUTOMATA THEORY

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$)

Answer ALL the questions.

1. What is the difference between DFA and NFA?

2. Draw a diagram for finite automata which represents a bank.

3. Define a context-free language.

4. Construct a derivation tree for the string 0011000 using the grammar $S \to AOS \mid O \mid SS, A \to S \mid A \mid 10$.

5. List any two properties of push down automata.

6. What is an instantaneous description in PDA.

7. Give three general approaches to the implementation of a lexical analyzer.

8. What is the role of input buffering in lexical analyzer?

9. What is meant by Global correction?

10. Give the input and output of nonrecursive predictive parsing.

PART B — ($5 \times 5 = 25$)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Show that if L is accepted by an NFA with ε – transitions, then L is also accepted by a NFA without ε – transition.

Or

(b) Construct finite state automata that recognizes all possible strings over the alphabet {0, 1} ending with two consecutive zero's.

12. (a) When do you say that a language L is unambiguous? Show that the Language $L = \{a^n b^n / n \geq 1\}$ is unambiguous.

Or

(b) Find a grammar in CNF equivalent to a grammar G whose production are $S \to aAbB$, $A \to aA \mid a$, $B \to bB \mid b$.

13. (a) Prove that CFLs are not closed under intersection.

Or

(b) Construct PDA that accepts the languages by empty stack $\{a^n b^{2n} / n >= 1\}$.

14. (a) Give the issues in lexical analysis.

Or

(b) Write an algorithm for stimulating an NFA.

15. (a) Draw the parse tree for the string abababa if the grammar $S \rightarrow SbS \mid a$ ambiguous.

Or

(b) Write a note on Error-Recovery strategies.

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

16. Give the characteristics of automation. Also prove that for any transition function δ and for any two input strings x and y, $\delta(q, xy) = \delta(\delta(q, x), y)$.

17. Convert the grammar $S \rightarrow aSb \mid bsa \mid a \mid b$ into GNF.

18. Construct a PDA that accepts all the odd palindromes over the alphabets { 0, 1 } excluding empty word by entering final state.

19. Explain how lexical analyzer can be implemented.

20. Discuss in detail about

    (a) Predictive parsers and

    (b) Transition diagrams of predictive passes.
