

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Bachelor of Technology (Computer Engineering) SEMESTER - 5 Summer 2025 (Supply.)

Course :Bachelor of Technology (Computer Engineering) Branch : Engineering and Technology

Semester : SEMESTER - 5

Subject Code & Name: BTCOC502 - THEORY OF COMPUTATIONS

Time : 3 Hours]

[Total Marks : 60

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No.6
4. Use of non-programmable scientific calculators is allowed.
5. Assume suitable data wherever necessary and mention it clearly.

Q1. Objective type questions. (Compulsory Question)

12

- 1 Alphabets are finite set of input symbols.
a) True b) False
- 2 Deterministic finite automata accepts null moves.
a) True b) False
- 3 Every DFA is NFA, but every NFA is not DFA.
a) True b) False
- 4 Which of the following is utilized in Lexical Analysis in Compiler?
a) Regular expressions b) Context Free grammar
c) Context Sensitive Grammar d) Turing Machine
- 5 A ____ machine is a finite state machine in which the current state and current input symbol determine the future state.
a) Moore b) Mealy c) Universal Turing machine d) Oracle Turing machine
- 6 The derivation tree is also known as ____
a) comprehend tree b) decipher tree c) parse tree d) deviated tree
- 7 A grammar is said to be ambiguous if ____.
a) More than one leftmost derivation b) More than one rightmost derivation
c) More than one parse tree for the given input string d) All of the above
- 8 Context-free grammar can be recognized by ____.
a) Push down Automata b) Turing machine
c) Linear Automata d) Mealy machine
- 9 According to Chomsky's hierarchy which of the following represents context-sensitive grammar?
a) Type 0 b) Type 1 c) Type 2 d) Type 3
- 10 Which of the following automaton is the most powerful?
a) Finite Automaton b) Pushdown Automaton
c) Turing Machine d) None of the above
- 11 Non-deterministic PDA is more powerful than DPDA deterministic PDA.
a) True b) False

- 12 The extra memory in pushdown automata is known as ____.
- a) queue b) stack c) flash memory d) array

Q2. Solve the following.

- A) Distinguish between Deterministic Finite Automaton and Non deterministic Finite Automaton. 6
- B) Form string set for following regular expressions. (i) 10^*1 (ii) 100^+ (iii) a^*b^* 6

Q3. Solve the following.

- A) Design Deterministic Finite Automaton that accepts even number of a's over alphabet "a". 6
- B) State and explain elements of Mealy machine. 6

Q4. Solve Any Two of the following.

- A) Explain the following. 6
- (i) Linear grammar (ii) Regular Grammar (iii) Recursive Grammar
- B) Prove that following grammar is ambiguous grammar. 6
- $E \rightarrow a \mid b$
 $E \rightarrow E - E$
- C) State and explain applications of regular expressions. 6

Q5. Solve Any Two of the following.

- A) Explain the components of Turing machine. 6
- B) Explain Church Turing Thesis. 6
- C) Explain the concept of infinite loop in Turing machine. 6

Q6. Solve Any Two of the following.

- A) Distinguish between deterministic and nondeterministic pushdown automaton. 6
- B) For the grammar given below, find an equivalent grammar in Compact Normal Form(CNF). 6
- $S \rightarrow AB$
 $A \rightarrow aab$
 $B \rightarrow aAC$
- C) How is Pushdown Automaton constructed from regular grammar? 6

*** End ***