

# COURSE TITLE: FORMAL LANGUAGES AND AUTOMATION THEORY

COURSE CODE: CSE322

Time Allowed: 2 hrs

Max. Marks: 70

Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.
2. This question paper contains 70 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
3. Do not write or mark anything on the question paper except your registration no. on the designated space.
4. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

- Q 1. There are \_\_\_\_\_ tuples in finite state machine.  
 A. 4 B. 5 C. 6 D. 7
- Q 2. Transition function maps.  
 A.  $\Sigma^* Q \rightarrow \Sigma$  B.  $Q^* Q \rightarrow \Sigma$  C.  $\Sigma^* \Sigma \rightarrow Q$  D.  $Q^* \Sigma \rightarrow Q$
- Q 3. Moore Machine is an application of:  
 A. Finite automata without input  
 C. Non-Finite automata with output  
 B. Finite automata with output  
 D. None
- Q 4. Which of the given are correct?  
 A. Moore machine has 6-tuples  
 C. Both Mealy and Moore has 6-tuples  
 B. Mealy machine has 6-tuples  
 D. None
- Q 5. A binary string is divisible by 4 if and only if it ends with:  
 A. 100 B. 1000 C. 1100 D. 0011
- Q 6. Which of the following is an application of Finite Automaton?  
 A. Compiler Design B. Grammar Parsers C. Text Search D. All
- Q 7. L is a regular Language if and only if the set of \_\_\_\_\_ classes of IL is finite.  
 A. Equivalence B. Reflexive C. Myhill D. Nerode
- Q 8. A finite automaton accepts which type of language:  
 A. Type 0 B. Type 1 C. Type 2 D. Type 3
- Q 9. Arden's theorem is true for:  
 A. More than one initial states  
 C. Non-Null Transitions  
 B. Null Transitions  
 D. None
- Q 10. The finite automata accept the following languages:  
 A. Context Free B. Regular C. Context Sensitive D. All
- Q 11. The total number of states required to automate the given regular expression  $(00)^*(11)^*$   
 A. 5 B. 4 C. 3 D. 6
- Q 12. The behavior of NFA can be simulated using DFA.  
 A. Always B. Never C. Sometimes D. None
- Q 13. While applying Pumping lemma over a language, we consider a string w that belong to L and fragment it into \_\_\_\_\_ parts.  
 A. 2 B. 3 C. 5 D. 6
- Q 14. Which kind of proof is used to prove the regularity of a language?  
 A. Proof by contradiction B. Direct proof C. Proof by induction D. None
- Q 15. Which of the following conversion is not feasible?  
 A. Regular expression to automaton conversion  
 C. Automaton to Regular Expression Conversion  
 B. NFA to DFA  
 D. None

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- Q 16. Conversion of regular expression to e-NFA takes \_\_\_\_\_ time.  
 A. Linear B. Exponential C. Logarithmic D. None
- Q 17. Which of the following cannot be converted in an ordinary NFA?  
 A. DFA B. Regular Expression C. e-NFA D. None
- Q 18. NFA to DFA conversion is done via  
 A. Subset Construction method B. Warshalls Algorithm  
 C. Ardens theorem D. None
- Q 19. The entity which generate Language is termed as:  
 A. Automata B. Tokens C. Grammar D. Data
- Q 20. The Grammar can be defined as:  $G = (V, \Sigma, p, S)$ . In the given definition, what does S represents?  
 A. Accepting State B. Starting Variable C. Sensitive Grammar D. None
- Q 21. Which of the expression is appropriate? For production  $p: a \rightarrow b$  where  $a \in V$  and  $b \in$  \_\_\_\_\_  
 A. V B. S C.  $(V + \Sigma)^*$  D.  $V + \Sigma$
- Q 22. Which of the following is not a notion of Context free grammars?  
 A. Recursive Inference B. Derivations C. Sentential forms D. All
- Q 23. Which of the following is/are the suitable approaches for inferencing?  
 A. Recursive Inference B. Derivations  
 C. Both Recursive Inference and Derivations D. None
- Q 24. If  $L_1$  and  $L_2$  are context free languages, which of the following is context free?  
 A.  $L_1^*$  B.  $L_2 \cup L_1$  C.  $L_1 L_2$  D. All
- Q 25. For the given Regular expression, the minimum number of terminals required to derive its grammar is:  
 $(011+1)^*(01)^*$   
 A. 4 B. 3 C. 5 D. 6
- Q 26. Which of the following languages are most suitable for implement context free languages?  
 A. C Language B. Perl Language C. Assembly Language D. None
- Q 27. The most suitable data structure used to represent the derivations in compiler:  
 A. Queue B. Linked List C. Tree D. Hash Table
- Q 28. The number of leaves in a parse tree with expression  $E^*(E)$  where  $*$  and  $()$  are operators  
 A. 5 B. 2 C. 4 D. 3
- Q 29. A grammar with more than one parse tree is called:  
 A. Unambiguous B. Ambiguous C. Regular D. None
- Q 30. 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
- Q 31. If w belongs to  $L(G)$ , for some CFG, then w has a parse tree, which tell us the \_\_\_\_\_ structure of w.  
 A. semantic B. syntactic C. lexical D. All of the these
- Q 32. To derive a string using the production rules of a given grammar, we use:  
 A. Scanning B. Parsing C. Derivation D. All of the these
- Q 33. Left corner parsing method uses which of the following?  
 A. Top down parser B. Bottom up parser  
 C. Top down and Bottom up parser D. None
- Q 34. Which of the following are always unambiguous?  
 A. Deterministic Context free grammars B. Non-Deterministic Regular grammars  
 C. Context sensitive grammar D. None



- Registration No: \_\_\_\_\_
- Q 35. A CFG is not closed under  
 A. Dot operation  
 B. Union Operation  
 C. Concatenation  
 D. Iteration
- Q 36. A push down automaton employs \_\_\_\_\_ data structure.  
 A. Queue  
 B. Linked List  
 C. Hash Table  
 D. Stack
- Q 37. Which of the operations are eligible in PDA?  
 A. Push  
 B. Insert  
 C. Delete  
 D. None
- Q 38. A string is accepted by a PDA when  
 A. Stack is empty  
 B. Acceptance state  
 C. Both (a) and (b)  
 D. None
- Q 39. Which among the following is not a part of the Context free grammar tuple?  
 A. End symbol  
 B. Start symbol  
 C. Variable  
 D. Production
- Q 40. Which of the following automata takes stack as auxiliary storage?  
 A. Finite automata  
 B. Push down automata  
 C. Turing machine  
 D. All of the these
- Q 41. NPDA stands for  
 A. Non-Deterministic Push Down Automata  
 B. Null-Push Down Automata  
 C. Nested Push Down Automata  
 D. All of the these
- Q 42. The production of the form  $A \rightarrow B$ , where A and B are non terminals is called  
 A. Null production  
 B. Unit production  
 C. Greibach Normal Form  
 D. Chomsky Normal Form
- Q 43. Which of the following correctly recognize the symbol '-' in context to PDA?  
 A. Transition function  
 B. or/not symbol  
 C. Moves  
 D. None
- Q 44. The instantaneous PDA is has the following elements  
 A. State  
 B. Unconsumed Input  
 C. Stack Content  
 D. All of these
- Q 45. Which of the following are the actions that operates on stack top?  
 A. Pushing  
 B. Popping  
 C. Replacing  
 D. All of the these
- Q 46. A DPDA is a PDA in which:  
 A. Atleast one state has more than one transitions  
 B. More than one state can have two or more outgoing transitions  
 C. No state p has two outgoing transitions  
 D. None of the mentioned
- Q 47. The transition a Push down automaton makes is additionally dependent upon the:  
 A. Stack  
 B. Input tape  
 C. Terminals  
 D. None
- Q 48. Context free grammar is called Type 2 grammar because of \_\_\_\_\_ hierarchy.  
 A. Greibach  
 B. Backus  
 C. Chomsky  
 D. None
- Q 49. A CFG consist of the following elements:  
 A. a set of terminal symbols  
 B. a set of non terminal symbols  
 C. a set of productions  
 D. all of the mentioned
- Q 50. The language  $L = \{a^i 2b^j | i \geq 0\}$  is:  
 A. recursive  
 B. deterministic CFL  
 C. regular  
 D. Two of the mentioned is correct
- Q 51. CFGs are more powerful than:  
 A. DFA  
 B. NDFA  
 C. Mealy Machine  
 D. All of the these
- Q 52. Which of the following are non essential while simplifying a grammar?  
 A. Removal of useless symbols  
 B. Removal of unit productions  
 C. Removal of null production  
 D. None of the mentioned

- Registration No: \_\_\_\_\_
- Q 53. A turing machine is a  
 A. LBA B. PDA C. Abstract D. None
- Q 54. 'a' in a-machine is :  
 A. automatic B. arbitrary C. Alan D. None
- Q 55. Which of the functions are not performed by the turing machine after reading a symbol?  
 A. Writes the symbol B. Moves the tape one cell left/right  
 C. Proceeds with next instruction or halts D. none
- Q 56. A turing machine that is able to simulate other turing machines:  
 A. Nested Turing machines B. Universal Turing machine  
 C. Counter machine D. None of the mentioned
- Q 57. Which of the following a turing machine does not consist of?  
 A. Input tape B. Head C. State register D. None
- Q 58. If  $\delta$  is not defined on the current state and the current tape symbol, then the machine  
 A. Does not halts B. Halts C. Goes into loop forever D. None
- Q 59. RASP stands for:  
 A. Random access storage program B. Random access stored program  
 C. Randomly accessed stored program D. Random access storage programming
- Q 60. The class of recursively enumerable language is known as:  
 A. Turing Class B. Recursive Languages C. Universal Languages D. RE
- Q 61. A Language L may not be accepted by a Turing Machine if:  
 A. It is recursively enumerable B. L can be enumerated by some turing machine  
 C. It is recursive D. None
- Q 62. The machine accept the string by entering into hA or hR can:  
 A. explicitly reject x by entering into hR B. enter into an infinite loop  
 C. Both (a) and (b) D. None
- Q 63. Which of the functions can a turing machine not perform?  
 A. Copying a string B. Deleting a symbol C. Accepting a pal D. Inserting a symbol
- Q 64. Which of the following is/are not an application of turing machine?  
 A. Language Recognition B. Computers of functions on non negative numbers  
 C. Generating devices D. None
- Q 65. Pick the odd one out.  
 A. Subroutines B. Multiple tracks C. Recursion D. Shifting over
- Q 66. A turing machine operates over:  
 A. finite memory tape B. infinite memory tape  
 C. depends on the algorithm D. none
- Q 67. The ability for a system of instructions to simulate a Turing Machine is called  
 A. Turing Completeness B. Simulation C. Turing Halting D. None
- Q 68. Turing machine can be represented using the following tools:  
 A. Transition graph B. Transition table  
 C. Queue and Input tape D. All of these
- Q 69. Which of the problems are unsolvable?  
 A. Halting problem B. Boolean Satisfiability problem  
 C. Both (a) and (b) D. None of the mentioned
- Q 70. The value of n if turing machine is defined using n-tuples:  
 A. 6 B. 7 C. 8 D. 9

--- End of Question Paper ---