Question Bank

Name of Subject:Theory of Computation **Subject Code: IT-14503**

Batch:2017-2021 **Class: D3IT (A and B)**

A. Two Marks

1. Explain finite automata.
2. Differentiate the + closure and * closure.
3. Elaborate alphabet, string, powers of an alphabet and concatenation of strings.
4. Elaborate language and Grammar and give an example.
5. Explain transition table and transition graph?
6. Give the DFA accepting the language over the alphabet 0, 1 that has the set of all strings beginning with 101.
7. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings that either begins or end(or both) with 01.
8. Elaborate NFA.
9. Difference between DFA and NFA.
10. Write the notations of DFA.
11. Elaborate ε-NFA.
12. Explain the language of NFA.
13. Is it true that the language accepted by any NFA is different from the regular language? Justify your Answer.
14. Explain Regular Expression.
15. Explain some operators of Regular Expressions
16. State pumping lemma for regular languages
17. Construct a finite automaton for the regular expression $(0+1)^*$
18. Classify some applications of the pumping lemma.
19. Elaborate Epsilon –Closures.
20. State minimization of DFA.
21. Illustrate if L be a set accepted by an NFA then there exists a DFA that accepts L.

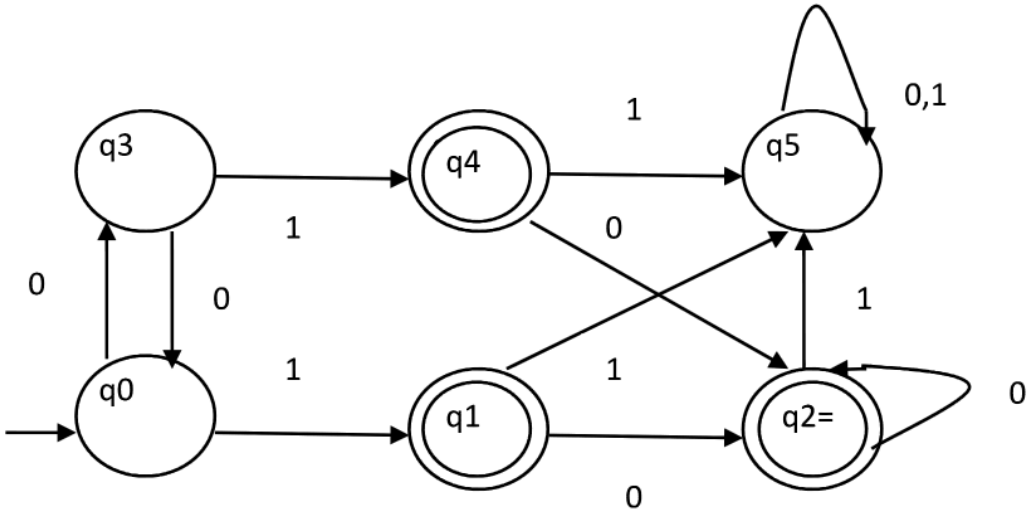
22. Differentiate moore ane miley machine?
23. Classify various types of grammer with their languages.
24. Create a FA which accepts the only input 101 over the input set Z={ 0,1}
25. Illustrate a regular expression for the set of all the strings
26. Explain Turing Machine?
27. Explain recursively enumerable language?
28. Explain variants of Turing Machine?
29. Illustrate multitape TM?
30. Explain nondeterministic TM?
31. Why some languages are not decidable or even Turing – recognizable?
32. Elaborate halting problem?
33. Prepare a Turing Machine that can accept the string over {0,1}, even number of 1's
34. Does NDPDA is more powerful than DPDA? Comment.
35. Compare deterministic and non-deterministic versions of PDA
36. Construct a PDA by empty store for $\{a^m b^n | m,n e" 1\}$
37. Classify some applications of Context Free grammar.
38. Explain reduced grammar.
39. Is it possible to reduce the unit production in context free grammar? Justify through example.
40. Elaborate terminology LR(k) grammars.
41. Compare NFA and PDA.
42. When is a string accepted by a PDA?
43. Classify some closure properties of CFL?
44. State the pumping lemma for CFLs
45. Classify some properties of CFL?
46. Differentiate 2-way FA and TM?
47. Classify some techniques for Turing machine construction?
48. Elaborate multihead TM.
49. When we say a problem is decidable? Give an example of undecidable problem?
50. Given a DFSM M and string w, when does M accept w?

B. Five Marks

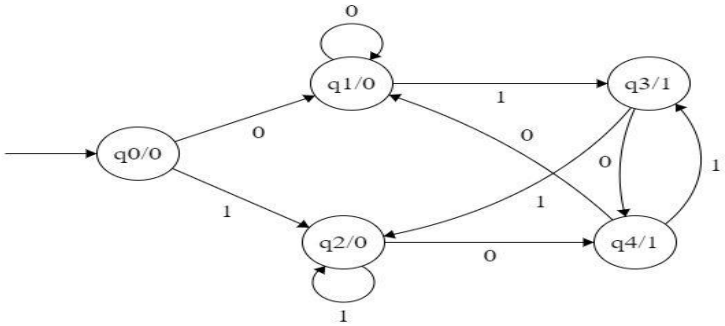
1. State pumping lemma . What are the conditions involved in it? Explain with an example.
2. Difference between DFA and NDFA with their State transition diagram
3. Draw a deterministic and non-deterministic finite automate which accept 00 and 11 at the end of a string containing 0, 1 in it, e.g., 01010100 but not 000111010.

   {HINT: Draw a string that accepts 000111010 and make Non final state to final state and final to non final}

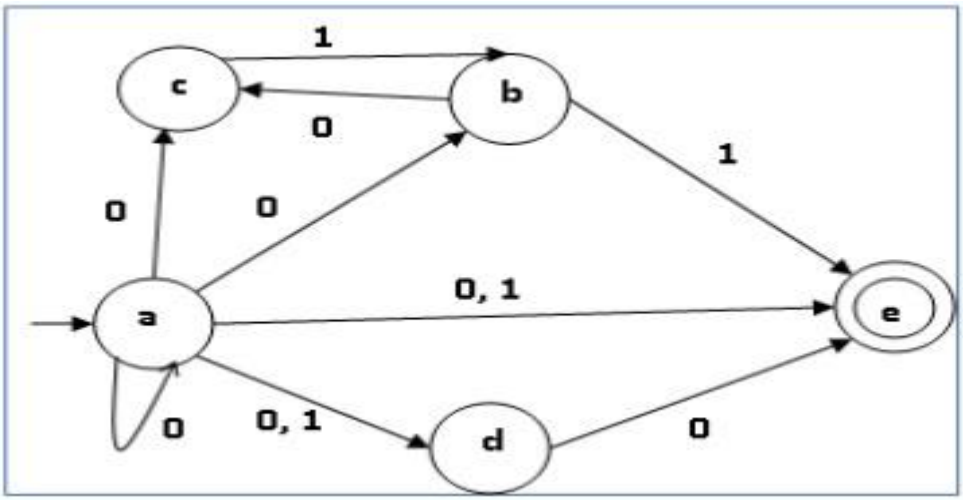
4. Prove that L = {ww | w ∈ {0, 1}*} is not regular.
5. Minimize the following DFA



6. Expand Chomsky Classification of language taking suitable example of each classification.
7. Construct a finite automata for the regular expression (0+1)*(00+11)(0+1)*.
8. Difference between Moore and Mealy Machines with their State transition diagram .
9. Convert Moore to Mealy Machine



10. Convert NDFA to DFA and then do minimization of that DFA.



11. Briefly explain the different types of Turing machines.
12. Design a TM to accept the language L={0n1n | n>=1}
13. Explain how a TM can be used to determine the given number is prime or not.
14. Prove that if L is recognized by a TM with a two way infinite tape if it is recognized by a TM with a one way infinite tape.
15. Prove that Halting problem is undecidable.
16. What are the various models of Turing Machine?
17. With an example explain the universal Turing machine
18. Show that a language is decidable if it is Turing-recognizable and co- recognizable
19. Construct PDA for the language L = $\{ww^R | W \text{ in } (a+b)^*\}$
20. Difference between Finite Automata and Turing Machines.
21. Design a Turing machine which recognises the language generated by the following regular grammar: G df = {a, b}, {S, A, B}, P, S P = { S → bA | aB, A → aB | a, B → bA | b }
22. How the modification of Turing machine is done?
23. Explain the definition of a non-deterministic push down automata (ndpa). Construct pda A accepting $L=\{wcw^T \mid w \in \{a,b\}^*\}$ by final state.
24. Show that $\{ a^m b^n c^p \mid m < n \text{ or } n < p\}$ is not deterministically context-free.
25. Describe the LR(k) and LL(k) grammars in detail.
26. Differentiate between leftmost and rightmost derivations.
27. Categorize the formal properties of LL(k) and LR(k) grammars.
28. Explain in detail the closure properties of Regular languages
29. Design PDA for odd number of palindromes

30. State and prove the Post's correspondence problem.

C. Ten Marks

1. Discuss Normal forms-Chomsky and Greibach Normal forms with example.
2. Discuss about PDA acceptance (1) From empty Stack to final state. (2) From Final state to Empty Stack
3. Explain Model of Turing Machine in detail
4. What are the differences between a Finite automata and a Turing machine?
5. Design a Turing Machine for L= $\{a^n b^n c^n\}$
6. Write short notes on the following: (i)Top Down Parsing And Bottom Up Parsing. (ii)Universal Turing Machine.
7. What is PDA? What are its closure properties? Draw a PDA that accepts $\{0^n1^n | n>=0\}$
8. Define regular language and regular expressions. Find regular expression for the following: Language of all string that do not end with 01. Describe the language corresponding to following: (1+01)*(0+01)*
9. Define Finite Automata . Explain its Types in Detail.DFA with $\sum = \{0, 1\}$ accepts all strings starting with 1.Write the regular expression for the language starting with a but not having consecutive b's.
10. Give proof for the statement : if L is a context free language, then can we construct a pda A accepting L by empty store, i.e. L=N(A).