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MSc. (IT), Semester - IV
Model Questions

Subject - Automata Theory
Paper- ECMIT402

Group-A

1. There are _____ tuples in finite state machine.
   a) 4
   b) 5
   c) 6
   d) unlimited

2. Transition function maps.
   a) Σ * Q -> Σ
   b) Q * Q -> Σ
   c) Σ * Σ -> Q
   d) Q * Σ -> Q

3. Finite automata requires minimum _____ number of stacks.
   a) 1
   b) 0
   c) 2
   d) None of the mentioned

4. Regular expression for all strings starts with ab and ends with bba is.
   a) aba*b*bba
   b) ab(ab)*bba
   c) ab(a+b)*bba
   d) All of the mentioned

5. Number of final state require to accept Φ in minimal finite automata.
   a) 1
   b) 2
   c) 3
   d) None of the mentioned

6. The basic limitation of finite automata is that
   a) It can't remember arbitrary large amount of information.
   b) It sometimes recognize grammar that are not regular.

c) It sometimes fails to recognize regular grammar.
d) All of the mentioned

7. Which of the following is a not a part of 5-tuple finite automata?
   a) Input alphabet
   b) Transition function
   c) Initial State
   d) Output Alphabet

8. Which among the following looks similar to the given expression?
   ((0+1). (0+1)) *
   a) {xϵ {0,1} *|x is all binary number with even length}
   b) {xϵ {0,1} |x is all binary number with even length}
   c) {xϵ {0,1} *|x is all binary number with odd length}
   d) {xϵ {0,1} |x is all binary number with odd length}

9. P, O, R be regular expression over ∑, P is not ε, then
   R=Q + RP has a unique solution:
   a) Q*P
   b) QP*
   c) Q*P*
   d) (P*O*) *

10. Which of the following represents a language which has no pair of consecutive 1's if ∑= {0,1}?
    a) (0+10)*(1+ε)
    b) (0+10)*(1+ε)*
    c) (0+101)*(0+ε)
    d) (1+010)*(1+ε)

11. The finite automata accept the following languages:
    a) Context Free Languages
    b) Context Sensitive Languages
    c) Regular Languages
    d) All the mentioned

12. Which of the following regular expressions represents the set of strings which do not contain a substring 'rt' if ∑= {r, t}
    a) (rt)*
    b) (tr)*
    c) (r*t*)
    d) (t*r*)

13. Which among the following is equivalent to the given regular expression?
    01*+1
    a) (01)*+1
    b) 0((1)*+1)
    c) (0(1)*)+1
    d) ((0*1)1*)*

14. Moore Machine is an application of:
    a) Finite automata without input
    b) Finite automata with output
    c) Non- Finite automata with output
    d) None of the mentioned

15. In mealy machine, the O/P depends upon?
    a) State
    b) Previous State
    c) State and Input
    d) Only Input

16. What is the relation between DFA and NFA on the basis of computational power?
    a) DFA > NFA
    b) NFA > DFA
    c) Equal
    d) Can’t be said

17. A language is regular if and only if
    a) accepted by DFA
    b) accepted by PDA
    c) accepted by LBA
    d) accepted by Turing machine

18. Let w= xyz and y refers to the middle portion and |y|>0.What do we call the process of repeating y 0 or more times before checking that they still belong to the language L or not?
    a) Generating
    b) Pumping
    c) Producing
    d) None of the mentioned

19. he Grammar can be defined as: G=(V, ∑, p, S)
    In the given definition, what does S represents?
    a) Accepting State
    b) Starting Variable
    c) Sensitive Grammar
    d) None of these

20. What the does the given CFG defines?
    S->aSbS|bSaS|e and w denotes terminal
    a) wwr
    b) wSw
    c) Equal number of a's and b's
    d) None of the mentioned

21. A grammar with more than one derivation tree is called:
    a) Unambiguous
    b) Ambiguous
    c) Regular
    d) None of the mentioned

22. Push down automata accepts _____ languages.
    a) Type 3
    b) Type 2
    c) Type 1
    d) Type 0

23. A string is accepted by a PDA when
    a) Stack is empty
    b) Acceptance state
    c) Both (a) and (b)
    d) None of the mentioned

24. NPDA stands for
    a) Non-Deterministic Push Down Automata
    b) Null-Push Down Automata
    c) Nested Push Down Automata
    d) All of the mentioned

25. The value of n if Turing machine is defined using n-tuples:
    a) 6
    b) 7

c) 8
d) 5

Group-B

1. What do you mean by Finite Automata? Differentiate between DFA and NFA.

2. Differentiate between Mealy Machine and Moore Machine.

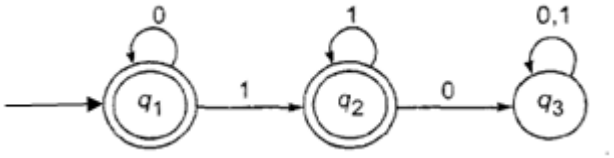
3. Construct a DFA which accepts set of all string containing even number of 0's and even number of 1's. Also draw its transition table.

4. What do you understand by Ambiguity in Grammar? Explain with help of an example.

5. What is pushdown Automata? Explain with Example.

6. Construct Finite Automata that accepts set of all strings with prefix 'ab' over ∑= {a, b}.

7. Define Regular Expression. Find Regular Expression of the following transition diagram:



8. What is Grammar? Construct grammar for following languages:

   a) L(G)= { $a^n b^n$: n>=0} b) L(G)= { $a^n b a^n$: n>=1}

9. Explain halting problem.

10. Explain PCP with help of example.

Group –C

11. What is Chomsky classification of Grammar? Explain with example.

12. Design Turing Machine for L= $\{a^n b^n : n >= 1\}$

13. Explain Turing machine. Design Turing machine for L= $\{0^n 1^n 2^n : n>=1\}$

14. What is Mealy Machine? Convert following Mealy Machine to Moore Machine.

Present State	Next state			
	Input a=0		Input a=1	
	State	Output	State	Output
->q_1	q_3	0	q_2	0
q_2	q_1	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_4	1	q_3	0

15. Design PDA for L= $\{a^n b^n : n >= 1\}$

16. Explain derivation tree with example.

17. Explain Pumping Lemma for regular sets.