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Question Bank

Class: S.Y.B. Sc.CS

Semester: III

Subject: Theory of Computation

UNIT I

1. The data structure used to represent the finite automata is _____.
 - a) Stack
 - b) Binaty Tree
 - c) Queue
 - d) Graph

2. An automation is a _____ device and a grammar is a _____ device.
 - a) generative, cognitive
 - b) generator , acceptor
 - c) acceptor , cognitive
 - d) cognitive , generative

3. There are _____ tuples in finite state machine / finite automata.
 - a) 4
 - b) 5
 - c) 6
 - d) 7

4. Transition Function for DFA is given by _____.
 - a) $\Sigma X Q \rightarrow \Sigma$
 - b) $Q X Q \rightarrow \Sigma$
 - c) $\Sigma X \Sigma \rightarrow Q$
 - d) $Q X \Sigma \rightarrow Q$

5. Transition Function for NDFa is given by _____.
 - a) $\Sigma X Q \rightarrow \Sigma$
 - b) $Q X Q \rightarrow \Sigma$
 - c) $\Sigma X \Sigma \rightarrow Q$
 - d) $Q X \Sigma \rightarrow 2^Q$

6. The next state of an automation at any instant of time is determine by the present _____ and the present _____.

- a) State , Output
 - b) Input , Output
 - c) State , Input
 - d) Output, Start State
7. A transition graph is a finite directed labelled graph in which each _____ represents a state and _____ indicate the transition of a state and the edges are labelled with input/output.
- a) Undirected edges , vertex
 - b) vertex , undirected edge
 - c) directed edge , vertex
 - d) vertex , directed edge
8. The acceptability of a string is decided by the reliability from the _____ to some _____ state.
- a) initial , current
 - b) current , final
 - c) initial , final
 - d) next , final
9. Given the language $L=\{ab, aa, baa\}$, which of the following strings are in L^* ? - (1)
 abaabaaabaa (2) aaaabaaaa (3) baaaaabaaaab (4) baaaaabaa
- a) (1), (2) and (3)
 - b) (2), (3) and (4)
 - c) (1), (2) and (4)
 - d) (1), (3) and (4)
10. Finite Automata accepts _____.
- a) Regular Languages
 - b) Context Free Languages
 - c) Context Sensitive Languages
 - d) Recursively Enumerable Languages
11. Push Down Automata machine represents _____.
- a) Type 0 Grammar
 - b) Type 2 Grammar
 - c) Type 2 Grammar
 - d) Type 3 Grammar
12. FSM can recognize _____
- a) any grammar
 - b) only CFG
 - c) any unambiguous grammar
 - d) only regular grammar
13. Following Grammar is _____ ($S \rightarrow bS \mid b \mid aA$, $A \rightarrow bA$)
- a) Type 3 Grammar
 - b) Type 2 Grammar
 - c) Type 2 Grammar
 - d) Type 0 Grammar
14. A type 1 grammar is also called _____.
- a) context dependent

- b) natural language
- c) context free
- d) regular grammar

15. During the representation of mealy machine where do we specify the output?

- a) On Transition Edge
- b) On Transition Edge along with input
- c) Inside Each State
- d) Inside Each State with input

16. During the representation of moore machine where do we specify the output ?

- a) Inside Each State with input
- b) Inside Each State
- c) On Transition Edge
- d) On Transition Edge along with input

17. Which rule is correct for Equivalent FA ? (Note: IS = Intermedia State , FS= Final State)

- a) IS-IS, FS-FS
- b) IS-FS, IS-FS
- c) FS-IS, FS-IS
- d) IS-FS, FS-IS

18. How many number of states are required to accept the string that ends with 00 over the $\Sigma = \{0,1\}$?

- a) 1
- b) 2
- c) 3
- d) 4

19. How many number of stacks are required by finite Automata ?

- a) 1
- b) 0
- c) 3
- d) 2

20. _____ model is used to model the regular expression ?

- a) Moore Machine
- b) Mealy Machine
- c) DFA
- d) NDFA

21. In Finite Automata, the final State is also called as _____ State.

- a) Goal
- b) Destination
- c) Accepting
- d) Finish

22. In Finite Automata, the start State is also called as _____ State.

- a) Initial

- b) Beginning
 - c) Go
 - d) Ground Zero
23. The Output of Moore Machine Depends only on _____
- a) States of the Machines
 - b) Input
 - c) Input as well as State
 - d) State as well as on the input at any instant of time
24. When the moves of the machine cannot be determined uniquely by the input symbol and the present state, such an automation is called _____ automation.
- a) Push Down
 - b) Linear Bound
 - c) Deterministic
 - d) Non Deterministic
25. Empty String (A) has _____ length.
- a) Zero
 - b) One
 - c) Double
 - d) Cannot Determine

UNIT II

26. In any grammar, the finite vocabulary of symbol is referred as _____
- a) Non-Terminal
 - b) Terminal
 - c) Production
 - d) Start State
27. In any grammar, the finite vocabulary of extra symbol is referred as _____
- a) Non-Terminal
 - b) Terminal
 - c) Production
 - d) Start State
28. Regular Grammar : $S \rightarrow aS \mid bS \mid a \mid b$. Is equivalent to regular expression _____
- a) $(a+b)$
 - b) $(a+b)(a+b)^*$
 - c) $(a+b)(a+b)$
 - d) $(a+b)^*$
29. What regular expression matching zero or more specific character ?
- a) *
 - b) +
 - c) &
 - d) #
30. Regular Expression $(x+y)(x+y)$ denotes the set _____

- a) $\{xy,xy\}$
 b) $\{xx,xy,yx,yy\}$
 c) $\{x,y\}$
 d) $\{x,y,xy\}$
31. The regular expression that denotes zero or more instances of x and/or y is _____
 a) $(x+y)$
 b) $(x+y)^*$
 c) (x^*+y)
 d) $(xy)^*$
32. Write the regular expression to denote the language L over $\Sigma = \{a,b\}$ such that all the string do not contain the substring "ab".
 a) a^*b^*
 b) b^*a^*
 c) $(ab)^*$
 d) $(ba)^*$
33. The set of all strings of 0s and 1s ending in 00 can be described by the regular expression _____.
 a) $(01)^*00$
 b) 01^*00
 c) $(0+1)^*00$
 d) $(0+1)^*(00)^*$
34. The set $\{\epsilon, 0, 00, 000, \dots\}$ can also be represented by _____
 a) 0^*
 b) $0 + \epsilon$
 c) $\epsilon + 0$
 d) $0^* + 0$
35. The set of all strings over input set $\{0, 1\}$ in which all strings that begin and ends with 0 is _____
 a) $0.(0+1)^*.1 + 1.(0+1)^*0$
 b) $0.(0+1)^*.0$
 c) $1.(0+1)^*0 + 0.(0+1)^*.1$
 d) $0.(0+1)^* + (0+1)^*0$
36. _____ is used to show that certain sets are not regular.
 a) LBA
 b) TM
 c) Pumping Lemma
 d) PDA
37. The set $\{a^n . b^n \mid n=1, 2, 3, \dots\}$ can be generated by CFG _____
 a) $S \rightarrow ab \mid aSb$
 b) $S \rightarrow a \mid aSb$
 c) $S \rightarrow ab \mid aSb \mid \epsilon$
 d) $S \rightarrow ab$
38. The CFG $S \rightarrow aS \mid bS \mid a \mid b$ is equivalent to regular expression

- a) $(a+b)$
- b) $(a+b)(a+b)^*$
- c) $(a+b)(a+b)$
- d) $(a+b)^*$

39. Any String of terminals that can be generated by the following CFG is

$S \rightarrow XY, X \rightarrow aX \mid bX \mid a, Y \rightarrow Ya \mid Yb \mid a$ is _____

- a) has atleast one 'b'
- b) should end in a 'a'
- c) has no consecutive a's or b's
- d) has atleast two a's

40. Which of the following does not belong to context free grammar ?

- a) Non-Terminal Symbol
- b) Terminal Symbol
- c) Start Symbol
- d) End Symbol

41. Which of the following is format of unit production ?

- a) $A \rightarrow B$
- b) $A \rightarrow a$
- c) $A \rightarrow$
- d) $A \rightarrow \epsilon$

42. A Context free grammar G is in Chomsky normal form if every production is of the form

- _____
- a) $A \rightarrow BC \mid A$
 - b) $A \rightarrow BC \mid a$
 - c) $A \rightarrow BCa, B \rightarrow b$
 - d) $A \rightarrow BCa, C \rightarrow b$

43. A derivation tree is also called _____

- a) null tree
- b) binary tree
- c) acyclic graph
- d) parse tree

44. Grammar consist of _____ tuples

- a) 2
- b) 3
- c) 4
- d) 5

45. _____ is a combination of finite state machine and a stack

- a) PDA
 - b) LBA
 - c) Turing Machine
 - d) Finite Automata
46. Write the transition function for : While being on state q_0 , if input 'a' is occurred and 'R' is at the top of stack then move to state q_1 by pushing 'X' above 'R' in the stack.
- a) $\sigma(q_0, a, R) = \{(q_1, X)\}$
 - b) $\sigma(q_0, a, R) = \{(q_1, XX)\}$
 - c) $\sigma(q_0, a, X) = \{(q_1, XX)\}$
 - d) $\sigma(q_0, a, R) = \{(q_1, XR)\}$
47. The Symbol Z_0 used in PDA represents _____
- a) terminal symbol
 - b) initial stack symbol
 - c) start symbol
 - d) final state
48. If the PDA does not stop on accepting state and the stack is not empty, the string is _____
- a) is kept on hold
 - b) goes into loop forever
 - c) rejected
 - d) accepted
49. Write the transition function for : While being on state q_0 , if input 'a' is occurred and 'X' is at the top of stack then move to state q_1 by popping 'X' from the top of stack
- a) $\sigma(q_0, a, R) = \{(q_1, XR)\}$
 - b) $\sigma(q_0, a, X) = \{(q_1, \epsilon)\}$
 - c) $\sigma(q_0, a, R) = \{(q_1, \epsilon)\}$
 - d) $\sigma(q_0, a, R) = \{(q_1, X)\}$
50. PDA consist of _____ tuples.
- a) 7
 - b) 6
 - c) 5
 - d) 4

UNIT III

51. Turing Machine is more powerful than Finite State Machine because _____
- a) tape movement is confined to one direction
 - b) it has no finite state
 - c) it has the capability to remember arbitrarily long sequences of input symbols.
 - d) it does not have stack
52. A turing machine that is able to simulate other turing machine is called _____
- a) Nested Turing Machine
 - b) Universal Turing Machine
 - c) Counter Turing Machine
 - d) Nested Counter Turing Machine

53. In one move the Turing Machine can _____
- may change its state & write a symbol on the cell being scanned
 - write a symbol on the cell being scanned & move the head one position left or right
 - move the head one position left or right & may change its state
 - may change its state, write a symbol on the cell being scanned & move the head one position left or right
54. In multi head turing machine there are _____
- more than one heads of the turing machine
 - more than one input tapes of turing machine
 - similar to the basic model of turing machine
 - more than one head and input tape of the turing machine
55. Which of the following statement is wrong ?
- Turing Machine is a simple mathematical model of general purpose computer.
 - Turing Machine is more powerful than finite automata
 - Turing machine is not powerful than PDA
 - Turing machine head can move toward left as well as right on its input tape.
56. Turing machine can accept _____ languages
- Type 0
 - Type 1
 - Type 2
 - Type 3
57. If L is context sensitive language, then L is _____ by LBA. The converse is _____
- rejected , true
 - accepted , true
 - rejected , false
 - accepted , false
58. If a problem has an algorithm to answer it, we call it _____
- Decidable
 - Solvable
 - Recognizable
 - Answerable
59. The language accepted by a Turing Machine is called _____
- Recursive enumerable
 - Recursive
 - Non- Recursive
 - Non-Recursive enumerable
60. Halting states are of two types. They are _____
- Accept & Reject
 - Allow & Reject
 - Start & Reject
 - Allow & Start
61. _____ model sometime uses its own output as input for further computation.

- a) Pumping Lemma
 - b) LBA
 - c) PDA
 - d) Turing Machine
62. _____ Turing machine consist of one tape & multiple track
- a) Multitrack
 - b) Mutitape
 - c) Non-Deterministic
 - d) Mutistack
63. _____ Turing Machine have n tapes for reading and writing information with different finite control head
- a) Multitrack
 - b) Mutitape
 - c) Non-Deterministic
 - d) Mutistack
64. _____ Turing Machine is constructed by tree structure, creates different IDs for one transition function
- a) Multitrack
 - b) Mutitape
 - c) Non-Deterministic
 - d) Mutistack
65. _____ Turing Machine is like semi-infinite tape i.e read only tape that means you can only read but not write, we can move left or right in tape.
- a) Multitrack
 - b) Mutitape
 - c) Non-Deterministic
 - d) Mutistack
66. _____ is a NDTM which has a restricted length of tape but bounded by a linear function of the length of input string.
- a) Pumping Lemma
 - b) LBA
 - c) PDA
 - d) Turing Machine
67. LBA model contains _____ tape & _____ tape
- a) input , output
 - b) inward , outward
 - c) input , working
 - d) output , working
68. _____ is reprogrammable machine
- a) Universal Turing Machine
 - b) LBA
 - c) Pumping Lemma
 - d) Local Turing Machine

69. Two or more Turing Machine can be obtained to solve a collection of a simpler problems, so that the output of one Turing Machine forms the input to the next Turing Machine and so on. This is called as _____ Turing Machine
- Relay
 - Iterated
 - Composite
 - Halting
70. The Turing Machine applying its own output as input repetitively is called _____ Turing Machine
- Relay
 - Iterated
 - Composite
 - Halting
71. A language is said to be _____ if there exists a Turing Machine that accepts string of the language and every string is rejected if it is not belonging to that language.
- Executable
 - Complete
 - non-recursive
 - recursive
72. A class of decidable problems are called as _____
- solvable problem
 - unsolvable problem
 - recursive
 - non-recursive
73. LBA stands for _____
- Layer Bound Automata
 - Linking Bound Automata
 - Linear Bound Automata
 - Level Bound Automata
74. _____ model is used for accepting context sensitive language
- Universal Turing Machine
 - LBA
 - Pumping Lemma
 - Local Turing Machine
75. Which action is not performed by the read/write head of the input tape of Turing Machine?
- Move Left
 - Move Right
 - Remain Static
 - Skip and jump to next input