

## Theory of Automata Computation

Match the following :

- (i) Regular Grammar                      (a) Pushdown automaton  
(ii) Context free Grammar              (b) Linear bounded automaton  
(iii) Unrestricted Grammar            (c) Deterministic finite automaton  
(iv) Context Sensitive Grammar (d) Turing machine

- A    (c) (a) (b) (d)  
B    (c) (a) (d) (b)  
C    (c) (b) (a) (d)  
D    (c) (b) (d) (a)

**Answer B**

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For which of the following application regular expressions cannot be used?

- A            Designing compilers  
B            Developing text editors  
C            Simulating sequential circuits  
D            All of these

**Answer C**

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The word formal in formal languages means

- A            The symbols used have well defined meaning  
B            They are unnecessary ,in reality  
C            Only the form of the string of symbols is significant  
D            None of the above

**Answer C**

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Consider the set of strings on  $\{0,1\}$  in which, every substring of 3 symbols has at most two zeros. For example, 001110 and 011001 are in the language, but 100010 is not. All strings of length less than 3 are also in the language. A partially completed DFA that accepts this language is shown below.

- A    A  
B    B  
C    C  
D    D

**Answer D**

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FSM can recognize

- A            Any grammar  
B            Only CFG  
C            Any unambiguous grammar  
D            Only regular grammar

**Answer D**

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**Which of the following is the most general phase structured grammar ?**

- A Regular
- B Context-sensitive
- C Context free
- D None of the above

**Answer B**

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**For input null ,the output produced by a Mealy machine is**

- A Null
- B Dependent on present state
- C Depends on given machine
- D Cannot decide

**Answer A**

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**A formal grammar is a \_\_\_\_\_ for rewriting strings.**

- A Set of rules
- B Set of functions
- C Both A and B
- D None of the above

**Answer A**

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**The language accepted by finite automata is**

- A Context free
- B Regular
- C Non regular
- D None of these

**Answer B**

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**The basic limitation of a FSM is that**

- A It cannot remember arbitrary large amount of information
- B It sometimes recognizes grammar that are not regular
- C It sometimes fails to recognize grammars that are regular
- D All of the above

**Answer A**

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**A formal language theory is the discipline which studies**

- A Formal grammars and languages
- B Unusual grammars and languages
- C Both A and B
- D None of the above

**Answer A**

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**Finite state machine \_\_\_\_\_ recognize palindromes.**

- A Can
- B Cannot
- C May
- D May not

**Answer B**

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**How many states can a process be in ?**

- A 2
- B 3
- C 4
- D 5

**Answer D**

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**If two finite state machines are equivalent they should have the same number of**

- A States
- B Edges
- C States and edges
- D None of these

**Answer D**

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**Consider the regular expression  $(a + b) (a + b) \dots (a + b)$  (n-times). The minimum number of states in finite automaton that recognizes the language represented by this regular expression contains**

- A n states
- B  $n + 1$  states
- C  $n + 2$  states
- D  $2n$  states

**Answer B**

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**The following CFG**

**$S \rightarrow aB|bA, A \rightarrow a|as|bAA, B \rightarrow b|bs|aBB$**

**generates strings of terminals that have**

- A Odd number of a's and odd number of b's
- B Even number of a's and even number of b's
- C Equal number of a's and b's
- D Not equal number of a's and b's

**Answer C**

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**Which of the following permanent database that has an entry for each terminal symbol ?**

- A Literal table
- B Identifier table
- C Terminal table

- D Source table  
**Answer C**
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**The classic formalization of generative grammars first proposed by**

- A Alexender  
B Bill Gates  
C Noam Chomsky  
D Charles Babbage

**Answer A**

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**The equivalent grammar corresponding to the grammar  $G : S \rightarrow aA, A \rightarrow BB, B \rightarrow aBb \mid \hat{1}$  is**

- A  $S \rightarrow aA, A \rightarrow BB, B \rightarrow aBb$   
B  $S \rightarrow a \mid aA, A \rightarrow BB, B \rightarrow aBb \mid ab$   
C  $S \rightarrow a \mid aA, A \rightarrow BB \mid B, B \rightarrow aBb$   
D  $S \rightarrow a \mid aA, A \rightarrow BB \mid B, B \rightarrow aBb \mid ab$

**Answer D**

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**A language L is accepted by a finite automaton if and only if**

- A Context free  
B Context sensitive  
C Recursive  
D Right linear

**Answer D**

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**Finite automata are used for pattern matching in text editors for**

- A Compiler lexical analysis  
B Programming in localized application  
C Both A and B  
D None of the above

**Answer A**

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**A FSM can be used to add how many given integers?**

- A 1  
B 3  
C 4  
D 5

**Answer B**

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**Any syntactic construct that can be described by a regular expression can also be described by a**

- A Context sensitive grammar  
B Context sensitive grammar  
C Context free grammar

D None of the above

**Answer C**

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**Given the following statements :**

**(i) The power of deterministic finite state machine and nondeterministic finite state machine are same.**

**(ii) The power of deterministic pushdown automaton and nondeterministic pushdown automaton are same.**

A Both (i) and (ii)

B Only (i)

C Only (ii)

D Neither (i) nor (ii)

**Answer B**

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**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

**Answer C**

---

**Regular languages are recognized by**

A Finite automaton

B Pushdown automaton

C Turing machine

D All of these

**Answer D**

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**Set of regular languages over a given alphabet set, is not closed under**

A Union

B Complementation

C Intersection

D None of the above

**Answer D**

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**Two finite states are equivalent if they**

A Have same number of states

B Have same number of edges

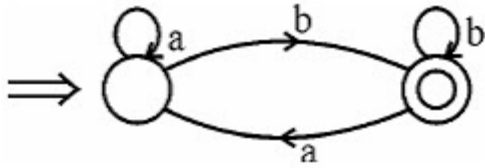
C Have same number of states and edges

D Recognize same set of tokens

**Answer C**

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The regular expression for the following DFA



- A  $ab^*(b + aa^*b)^*$
- B  $a^*b(b + aa^*b)^*$
- C  $a^*b(b^* + aa^*b)$
- D  $a^*b(b^* + aa^*b)^*$

**Answer D**

Which of the following is the most phase structured grammar?

- A Regular
- B Context free
- C Context sensitive
- D None of the above

**Answer C**

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Context-free Grammar (CFG) can be recognized by

- A Finite state automata
- B 2-way linear bounded automata
- C push down automata
- D both (B) and (C)

**Answer D**

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Context free languages are not closed under

- A Union
- B Concatenation
- C Closure
- D Iteration

**Answer D**

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Which of the following is most powerful?

- A DFA
- B NDFA
- C 2PDA
- D DPDA

**Answer C**

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All strings having equal number of a and b can be recognized by

- A DFA

- B NDFA
- C PDA
- D All of these

**Answer C**

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**Which of the following is not true?**

- A Power of deterministic automata is equivalent to power of non deterministic automata
- B Power of deterministic pushdown automata is equivalent to power of non deterministic pushdown automata
- C Power of deterministic turing machine is equivalent to power of deterministic turing machine
- D All of the machine

**Answer B**

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- A A
- B B
- C C
- D D

**Answer D**

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**A push Down Machine behaves like a Turing Machine when number of auxiliary memory it has**

- A 2
- B 1
- C 0
- D 4

**Answer A**

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**If every string of a language can be determined whether it is legal or illegal in finite time the language is called**

- A Decidable
- B Undecidable
- C Interpretive
- D Non deterministic

**Answer A**

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**FORTRAN is a**

- A Regular language
- B Context free language
- C Context sensitive language
- D Turing machine

**Answer B**

**Pumping lemma is used for proving**

- A A given grammar is regular
- B A given language is regular

- C A given language is not regular
- D All of the above

**Answer C**

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**The logic of pumping lemma is a good example of**

- A The pigeon hole principle
- B Divide and conquer method
- C Iteration
- D Recursion

**Answer A**

**Which of the following is not primitive recursive but partially recursive?**

- A Carnot function
- B Rieman function
- C Bounded function
- D Ackermann function

**Answer D**

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**A turing machine is similar to a finite automaton with only one difference of**

- A Read/write
- B Input tape
- C Finite state control
- D All of these

**Answer A**

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**Which of the following statements is false?**

- A A Turing machine is more powerful than finite state machine because it has no finite state
- B A finite state machine can be assumed to be a Turing machine of finite tape length without rewinding capability and unidirectional tape movement
- C Both A and B
- D None of the above

**Answer A**

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**A PDM behaves like a TM when the number of auxiliary memory it has is**

- A Zero
- B One or more
- C Two or more
- D None of these

**Answer C**

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**Which of the following statements is/are FALSE?**

- (1) For every non-deterministic Turing machine, there exists an equivalent deterministic Turing machine.
- (2) Turing recognizable languages are closed under union and complementation.



- (3) Turing decidable languages are closed under intersection and complementation  
(4) Turing recognizable languages are closed under union and intersection.

- A 1 and 4 only  
B 1 and 3 only  
C 2 only  
D 3 only

**Answer C**

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**Push down machine represents**

- A Type 0 Grammar  
B Type 1 grammar  
C Type-2 grammar  
D Type-3 grammar

**Answer C**

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**Which of the following statements is false?**

- A If a language is not recursively enumerable then its complement cannot be recursive  
B The family of recursive languages is closed under union  
C The family of recursive languages is closed under intersection  
D None of the above

**Answer D**

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**Consider the following statements :**

- I. Recursive languages are closed under complementation.  
II. Recursively enumerable languages are closed under union.  
III. Recursively enumerable languages are closed under complementation.

**Which of the above statements are true ?**

- A I only  
B I and II  
C I and III  
D I and III

**Answer B**

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**A recursive enumerable language is**

- A Accepted by TM  
B Not accepted by TM  
C Sometimes accepted and sometimes not accepted  
D None of the above

**Answer A**

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**Which of the following statements is false?**

- A Every context sensitive language is recursive  
B Every recursive language is context sensitive  
C Both A and B

D None of the above

**Answer B**