Subject:-Mathematical Foundations of Computer Science
Code:- MTCE 603A

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

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

_____

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

_____

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

_____

FSM can recognize

A   Any grammar

B   Only CFG

C   Any unambiguous grammar

D   Only regular grammar

Answer D

_____

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

_____

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

_____

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

_____

The language accepted by finite automata is

A   Context free

B   Regular

C   Non regular

D   None of these

Answer B

_____

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

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

Finite state machine_____recognize palindromes.

A   Can

B   Cannot

C   May

D   May not

Answer B

How many states can a process be in ?

A   2

B   3

C   4

D   5

Answer D

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

Consider the regular expression (a + b) (a + b) … (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

The following CFG
S®aB|bA, A®a|as|bAA, B®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

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

The classic formalization of generative grammars first proposed by

A   Alexender

B   Bill Gates

C   Noam Chomsky

D   Charles Babbage

     Answer A

The equivalent grammar corresponding to the grammar G : S®aA, A®BB, B®aBb|Î is

A   S®aA, A®BB, B®aBb

B   S®a|aA, A®BB, B®aBb|ab

C   S®a|aA, A®BB|B, B®aBb

D   S®a|aA, A®BB|B, B®aBb|ab

    Answer D

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

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

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

A   1

B   3

C   4

D   5

    Answer B

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

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

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

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

A   Union

B   Complementation
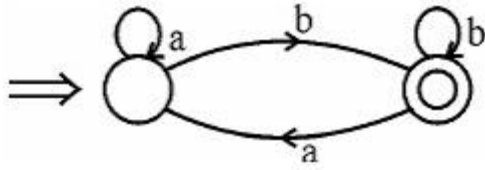
C   Intersection

D   None of the above

   Answer D

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

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

Contex-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

Context free languages are not closed under

A   Union

B   Concatenation

C   Closure

D   Iteration

Answer D

Which of the following is most powerful?

A   DFA

B   NDFA

C   2PDA

D   DPDA

Answer C

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

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

A A

B B

C C

D D

   Answer D

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

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

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

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

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 undirectional tape movement

C Both A and B

D None of the above

   Answer A

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

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

Push down machine represents

A   Type 0 Grammar

B   Type 1 grammar

C   Type-2 grammar

D   Type-3 grammar

         Answer C

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

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

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

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