CSE 316 (R-15)

Total No. of Questions :09] [Total No. of Pages : 02

III/IV B.Tech. DEGREE EXAMINATIONS, NOVEMBER- 2019

First Semester

COMPUTER SCIENCE ENGINEERING

LANGUAGES, MACHINES AND COMPUTATION

Time: Three Hours **Maximum marks:60**

Answer Question No.1 Compulsory **6X2=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. a) Construct a finite automaton that accepts {0,1}*
   b) What are context sensitive languages?
   c) What are the differences between DFA and NFA?
   d) List out the properties of recursive and recursively enumerable language.
   e) Give examples of an undecidable problem.
   f) Brief on Universal Turing machine.

UNIT-I

2. a) Construct a finite state automata that recognizes all possible strings over the alphabet {0,1} ending with two consecutive zeros.
   b) Explain closure properties of regular languages.

(OR)

3. a) Construct a finite state automata with $\in$-trasnsition for the regular expression r = 01*+10.
   b) Construct a finite state automata equivalent to the regular expression.

   (0+1)*(00+11)(0+1)*

UNIT-II

4. a) Construct a DFA to accept the language L={w/w has both an even number of 0's and even number of 1's}
   b) Prove that regular sets are closed under union and complementation.

P.T.O

(OR)

5. Discuss about equivalence of NFA and DFA. For the regular expression (0+1)*(00+1), obtain an NFA without $\in$-moves.

UNIT-III

6. a) Consider the CFG with the following production rules:
S -> aB | bA, A -> bAA |aS | a, B -> aBB |bS|b. Give the right most derivation and draw derivation tree for the string '*abbaab*'.

   b) Prove that the following grammar of arithmetic expression is ambiguous.
E -> E+E | E*E | (E) | (id)

(OR)

7. a) Convert the following grammar to a PDA that accepts the language by empty stack.
S -> 0S1 | A, A -> 1A0 | S | $\in$

   b) Using Pumping Lemma of CFL, Prove that the language given below is not context free. L ={ $a^i b^j c^k$ | i<j<k}.

UNIT-IV

8. Define Turing machine. Design A Turing Machine to recognize the language $\{1^n2^n3^n | n >= 1\}$

(OR)

9. Give a brief on multi tape Turning machine. Design a Turing Machine which can multiply two positive integers.

CSE 316 (R-15)

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III/IV B.Tech. (Supple) DEGREE EXAMINATIONS, JUNE- 2019

First Semester

COMPUTER SCIENCE ENGINEERING

LANGUAGES, MACHINES AND COMPUTATION

Time: Three Hours **Maximum marks:60**

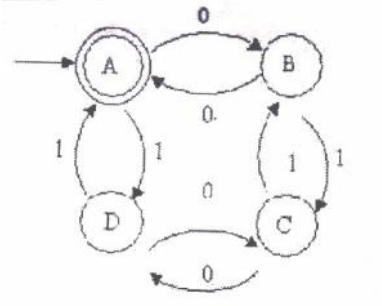
Answer Question No.1 Compulsory **6X2=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. a) Define grammar
   b) Type 2 Production form
   c) Recursive definition of regular expression
   d) Ambiguous grammar
   e) Deterministic PDA
   f) Universal TM

UNIT-I

2. a) Consider below transition diagram and verify whether the following Strings will be accepted or not? Explain.
   i) 0011 ii) 010101 iii) 111100 iv) 1011101



   b) Define NFA and explain with an example.

(OR)

3. Find a Regular expression corresponding to each of the following subsets over {0,1}*.

P.T.O

a) The set of all strings containing no three consecutive 0's

b) The set of all strings where the 10th symbol from right end is a 1.

c) The set of all strings over {0,1} having even number of 0's & odd number of 1's

d) The set of all strings over {0,1} in which the number of occurences of is divisible by 3.

UNIT-II

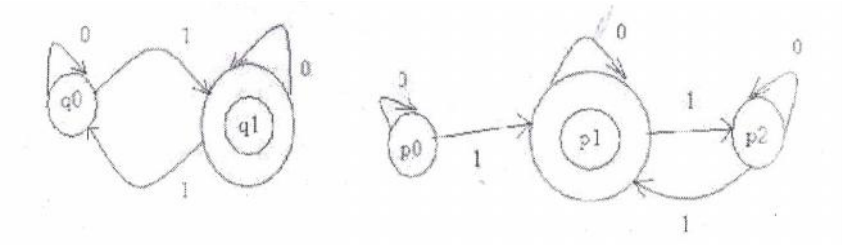
4. Consider the two regular expressions: R=0*1*, S=01*10*+1*0+(0*1)*

   a) Find a string corresponding to R but not to S

   b) Find a string corresponding to S but not to R

(OR)

5. a) Show that the Finite Automata are equivalent:



   b) Construct NFA for the following regular expression: (0+1)*(01+110)

UNIT-III

6. a) Convert the following grammar into CNF.

   S->aAD A->aB | bAB B->b D->d

   b) What do you mean by Greibach Normal Form (GNF)? When is a CFG said to be in GNF?

(OR)

7. a) Find the PDA with only one state that accepts the language $\{a^m b^n | n > m\}$.

   B) Find the CFG corresponding to PDA whose transition mapping is as follows:

   $¢(S,a,\times)=(s,A\times)$ $¢(S,b,A)=(s,AA)$ $¢(S,a,A)=(s,\wedge)$

UNIT-IV

8. a) What are the types of Turing Machines? Explain.

   b) Give a Turing machine that computes ones complement of a binary number

(OR)

9. What are NP-complete and NP-hard problems? Explain them with examples.