Hall Ticket Number:

III/IV B.Tech (Regular) DEGREE EXAMINATION

November, 2016 **Common for CSE & IT**

Fifth Semester **Automata Theory & Formal Languages**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12=12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

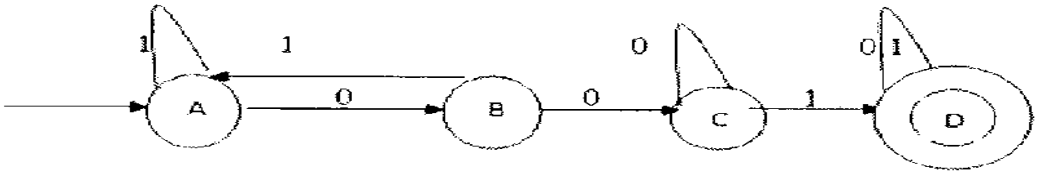
1. Define the following (12X1= 12 Marks)

a) Define String, Alphabet and Language.
b) What are the applications of automata theory?
c) What are the components of Finite automaton model?
d) Construct a r.e for the language which accepts all strings with at least two c's over the set Σ={c,b}.
e) What are the applications of pumping lemma?
f) What is the closure property of regular sets?
g) What are the uses of Context free grammars?
h) What is an ambiguous grammar?
i) Compare NFA and PDA.
j) What are the properties of CFL?
k) What are the techniques for Turing machine construction?
l) When we say a problem is decidable? Give an example of undecidable problem?

UNITI

2. a) Design Deterministic Finite Automata to accept strings with a's and b's such that number of a's are divisible by 3. (6M)

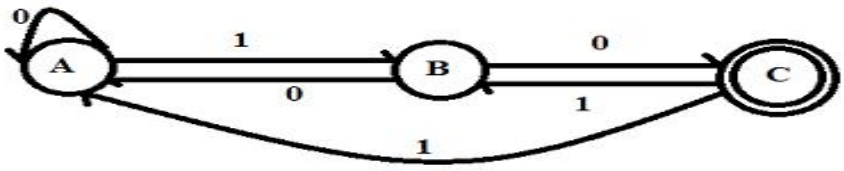
b) Describe finite state machine and tell whether the string 1010011is acceptedby the following finite automata. If accepted write the state sequence. (6M)



(OR)

3. a) Define NFA and DFA, write significant differences between them. (6M)

b) Convert the following NFA to DFA. (6M)



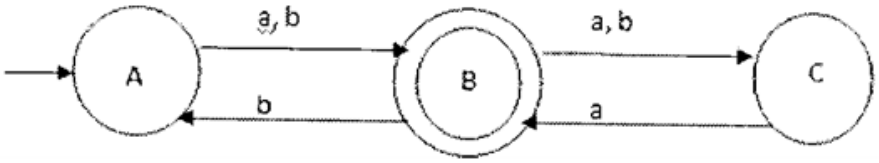
UNIT-II

4. a) Consider the two regular expressions (6M)
r=0*+1*, s=01*10*+1*0+(0*1)*

i) Find a string corresponding to r but not to s.

ii) Find a string corresponding to s but not to r.

b) Find the Regular expression for the following finite automaton (6M)



(OR)

5. a) Prove the following regular expression identities: (6M)

(i) 1 + (1 + 0)(1 + 0)* 1 = 0* 1

(ii) 1 + 1* (011)* (1* (011)*)* = (1 + 011)*

b) Define the language square as follows: (6M)

square = {a^n where n is a square, n>0}

Using the pumping lemma to prove that square is non-regular.

UNIT- III

6. a) Convert the following grammar to CNF (6M)

S→ABA|AB|BA|AA|B

A→aA|a

B→bB|b

b) Consider the following context free grammar: (6M)

E→I|E+E|E*E|(E)

I→ a|b|Ia|Ib|I0|I1

Find the leftmost derivation, rightmost derivation, and parse tree for the string: a*(a+b00).

(OR)

7. a) Define a PDA. Design a PDA for L={xcx^r /x∈{a,b}*} (6M)

Process the string "abbacabba"

Note: x^r stands for reverse of a string x.

b) Design PDA for the grammar G = (V_n, Vt, P, S) where V_n = {S} V_t = {a,b,c} and P is defined as

S→ aSa, S→bSb, S→c (6M)

UNIT-IV

8. a) What is instantaneous description of a TM? Briefly explain. (6M)

b) Design a Turing Machine for the language L={SS|S is a string from an alphabet {a,b}*} (6M)

(OR)

9. a) What are Undecidable Problems? Explain With Examples. 6M)

b) State and explain the Undecidability of post correspondence problem. (6M)