14IT402

Hall Ticket Number:

II/IV B.Tech (Regular\Supplementary) DEGREE EXAMINATION

November, 2019 **Information Technology**

Fourth 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. Answer all questions (1X12=12 Marks)
   a) Define finite automaton.
   b) Differentiate NFA and DFA.
   c) What is the relation between $\Sigma^* = \Sigma^+$
   d) What is regular expression?
   e) Is (r*)* = r* ?
   f) Define Homomorphism.
   g) Define CFG.
   h) What is ambiguous grammar?
   i) How many ways can PDA accepts the string?
   j) Define Turing Machine.
   k) What is instantaneous description of a TM?
   l) What is recursively enumerable language?

UNIT I

2. a) Give the DFA which accepts the language over ∑={a,b} that have the set of all strings starts and ends with ***aab.*** 6M
   b) Design a DFA to accept the language L= { w | w has both an even number of 0's and an even number of 1's} 6M

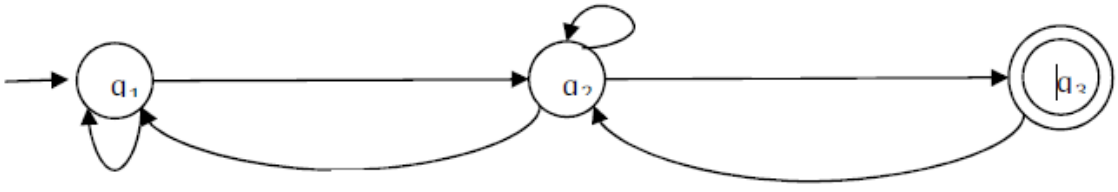
(OR)

3. a) If a language L is accepted by some ε–NFA then show that the language L is also accepted by some DFA 6M
   b) Construct a DFA equivalent to the NFA given by M = ({p,q,r,s}, {0,1}, δ , p, {s}), where δis defined in the following table. 6M

	0	1
p	{p,q}	{p}
q	{r }	{r}
r	{s }	-
s	{s }	{s}

UNIT II

4. a) Show that L = $\{0^n102^n / n \geq 0\}$ is not regular 6M
   b) Find out the RE for the following 6M



(OR)

5. a) Construct an FA for RE 10 + (0 + 11)0*1 6M
   b) Discuss briefly the algebraic law's for regular expressions. 6M

UNIT III

6. a) Let G be a grammar S->0B | 1A, A->0 | 0S |1AA, B->1 |1S | 0BB. For the string **00110101** find its leftmost derivation and derivation tree. 6M

b) Discuss about the following 6M

(i) Chomsky's Normal Form (ii) Greibach Normal form

(OR)

7. a) Design a PDA for the language L={ WW^R / W is in $(0+1)^*$ } 6M
   b) Construct a PDA equivalent to the following grammar 6M

$S \rightarrow aAA$

$A \rightarrow aS / bS / a$

UNIT IV

8. a) Explain the Basic Turing Machine model and explain in one move. What are the actions take place in TM? 6M
   b) Design a Turing Machine to accept the language L={$0^n 1^n$/n>=1}. 6M

(OR)

9. a) State the decision properties of Context free languages. 6M
   b) State and explain Post Correspondence problem with suitable example. 6M

ATFL (14IT402) Question Paper

a) Define finite automaton.

b) Differentiate NFA and DFA.

c) What is the relation between $\Sigma^* = \Sigma^+$

d) What is regular expression?

e) Is (r*)* = r* ?

f) Define Homomorphism.

g) Define CFG.

h) What is ambiguous grammar?

i) How many ways can PDA accepts the string?

j) Define Turing Machine.

k) What is instantaneous description of a TM?

l) What is recursively enumerable language?

UNIT-I

2 a) Give the DFA which accepts the language over ∑={a,b} that have the set of all strings starts and ends with ***aab.*** 6M

2 b) Design a DFA to accept the language L= { w | w has both an even number of 0's and an even number of 1's} 6M

(OR)

3 a) If a language L is accepted by some ε–NFA then show that the language L is also accepted by some DFA.

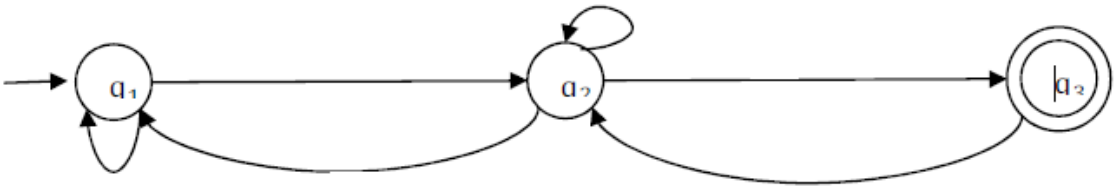
3 b) Construct a DFA equivalent to the NFA given by M = ({p,q,r,s}, {0,1}, δ , p, {s}), where δis defined in the following table.

	0	1
p	{p,q}	{p}
q	{r }	{r}
r	{s }	-
s	{s }	{s}

UNIT-II

4 a) Show that L = $\{0^n102^n / n \geq 0\}$ is not regular. 6M

4 b) Find out the RE for the following 6M



5 a) Construct an FA for RE 10 + (0 + 11)0*1 6M

5 b) Discuss briefly the algebraic law's for regular expressions. 6M

UNIT-III

6 a) Let G be a grammar S->0B | 1A, A->0 | 0S |1AA, B->1 |1S | 0BB. For the string **00110101** find its leftmost derivation and derivation tree. (6M)

6 b) Discuss about the following

(i) Chomsky's Normal Form (ii) Greibach Normal form (6M)

(OR)

7 a) Design a PDA for the language L={ WW^R / W is in $(0+1)^*$ } 6M

7 b) Construct a PDA equivalent to the following grammar 6M

S→ aAA

A→ aS / bS / a

UNIT-IV

8. a) Explain the Basic Turing Machine model and explain in one move. What are the actions take place in TM? (6M)

b)Design a Turing Machine to accept the language $L=\{0^n 1^n / n>=1\}$. (6M)

(OR)

9. a) State the decision properties of Context free languages. (4M)

b)State and explain Post Correspondence problem with suitable example. (8M)