Code No: 07A50501 **R07** **Set No. 2**

III B.Tech I Semester Examinations,November 2010
FORMAL LANGUAGES AND AUTOMATA THEORY
Computer Science And Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define String, Alphabet and Language.
   (b) Prove that if $\delta(q, x) = \delta(q, y)$, then $\delta(q, xz) = \delta(q, yz)$ for all strings z in Σ^+.
   (c) Construct DFA and NFA accepting the set of all strings with three consecutive 0's. [6+4+6]

2. Describe, in the English language, the sets represented by the following regular expressions:
   (a) a(a+b)*ab
   (b) a*b + b*a [16]

3. Design Turing Machine which recognizes the words of the form
   L = { 0^n1^n | n>=1} [16]

4. Convert the following Context Free Grammar to Greibach Normal Form
   G={({S,A,B},{a,b},P,S)}
   P is
   S→AB
   A→BS / a
   B→SA / b [16]

5. Construct LR(0) items for the following grammar
   E → E + T | T
   T → T * F | F
   F → (E) | id [16]

6. (a) Write the steps in minimization of FA.
   (b) Construct a Moore machine to determine the residue mod 3 for each binary string treated as a binary interger. [8+8]

7. Find the language generated by the following grammars.
   (a) S→0S1 | 0A1, A→1A | 1
   (b) S→0S1 | 0A | 0 | 1B | 1, A→0A | 0 , B→1B | 1 [8+8]

8. (a) Convert the following Context Free Grammar to Push Down Automata
   S→0A
   A→0ABC | 1B | 0
   B→ 1

C→ 2

(b) Verify the string 001112 is accepted by equivalent Push Down Automata[10+6]

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Code No: 07A50501 **R07** **Set No. 4**

III B.Tech I Semester Examinations,November 2010
FORMAL LANGUAGES AND AUTOMATA THEORY
Computer Science And Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Differentiate Push Down Automata and Linear Bounded Automata
   (b) Differentiate Context Free Languages and Context Sensitive Languages [8+8]
2. (a) Explain the procedure to convert Context Free Grammar to Push Down Automata
   (b) Convert the following Context Free Grammar to Push Down Automata
   S→ aAA
   A→aS | bS | a [8+8]
3. (a) Find NFA which accepts the set of all strings over $\{0,1\}$ in which the number of occurances of 0 is divisible by 3 and the number of occurances of 1 is divisible by 2.
   (b) Draw the transition diagram for a NFA which accepts all strings with either two consecutive 0's or two consecutive 1's.
   (c) Differentiate NFA and DFA. [6+6+4]
4. Let G be the grammer S → aB | bA, A→ a | aS | bAA, B→b | bS | aBB for the string aaabbabbba Find a
   (a) Left most derivation
   (b) Right most derivation
   (c) Parse Tree. [16]
5. (a) Construct a Mealy machine which is equivalent to the Moore machine given in table.

Present State	Next State		Output
	a=0	a=1	
→ q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

   (b) Construct the corresponding Mealy machine to the Moore machine described by the transition table given. [8+8]

Present Staate	Next State		Output
	a=0	a=1	
→ q_1	q_1	q_2	0
q_2	q_1	q_3	0
q_3	q_1	q_3	1

Code No: 07A50501 **R07** **Set No. 4**

6. (a) Construct a FA recognizing L (G), where G is the grammar S→aS | bA | b and A→aA| bS | a
   (b) Construct a DFA equivalent to the grammar S→aS | bS | aA, A→bB, B→aC, C→ ε [8+8]

7. (a) Eliminate ε -productions from the grammar G given as
   A→ aBb | bBa
   B→ aB | bB | ε
   (b) Convert the following grammar to Greibach Normal Form
   S → ABA | AB | BA | AA | B
   A → aA | a
   B → bB | b [8+8]

8. Design Turing Machine which will recognize strings containing equal number of 0's and 1's [16]

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Code No: 07A50501 **R07** **Set No. 1**

III B.Tech I Semester Examinations,November 2010
FORMAL LANGUAGES AND AUTOMATA THEORY
Computer Science And Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) If G=({S}, {0, 1}, {S→0S1, S→ ε}, S), find L(G).
   (b) If G=({S}, {a}, {S→SS}, S) find the language generated by G. [8+8]
2. (a) Construct DFA and NFA accepting the set of all strings not containing 101 as a substring.
   (b) Draw the transition diagram of a FA which accepts all strings of 1's and 0's in which both the number of 0's and 1's are even.
   (c) Define NFA with an example. [6+6+4]
3. Find regular expressions representing the following sets
   (a) The set of all stings over {0, 1} having at most one pair of 0's or atmost of one pair 1's
   (b) The set of all strings over{a, b} in which the number of occurrences of a is devisible by 3
   (c) The set of all strings over {a, b} in which there are at least two occurrences of b between any two occurrences of a.
   (d) The set of all strings over{a, b} with three consecutive b's [16]
4. Design Turing Machine for L = { 0^n 1^n 0^n | n ≥ 1 } [16]
5. (a) Convert the following grammar to Greibach Normal Form
   S→ SS
   S→0S1 | 01
   (b) Show that grammar is ambiguous
   S→aSbS | bSaS | ε [8+8]
6. (a) Construct a NFA accepting ab, ba and use it to find a deterministic automation accepting the same set.
   (b) $M = (\{q1, q2, q3\}, \{0, 1\}, \delta q1\, \{q3\})$ is a NFA where δ is given by
   $\delta(q1, 0) = \{q2, q3\}$, $\delta(q1, 1) = \{q1\}$
   $\delta(q2, 0) = \{q1, q2\}$, $\delta(q2, 1) = \emptyset$
   $\delta(q3, 0) = \{q2\}$, $\delta(q3, 1) = \{q1, q2\}$
   construct an equivalent DFA. [8+8]
7. Design Push Down Automata for L = {a^{2n} b^n | n≥1} [16]

8. Construct LR(0) items for the grammar given find it's equivalent DFA.
   $S^{|} \rightarrow S$
   $S \rightarrow AS \mid a$
   $A \rightarrow aA \mid b$ [16]

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Code No: 07A50501 **R07** **Set No. 3**

III B.Tech I Semester Examinations,November 2010
FORMAL LANGUAGES AND AUTOMATA THEORY
Computer Science And Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write the steps in construction of minimum automaton.
   (b) Write the applications of Finite Automata.
   (c) Define NFA with ε-moves. [8+6+2]
2. (a) Explain the procedure to Convert the Context Free Grammar to Push Down Automata
   (b) Convert the following Context Free Grammar to Push Down Automata
   S→ aSbb | aab [8+8]
3. Write about the following
   (a) Linear-Bounded Automata
   (b) Context-Sensitive Language
   (c) Decidability of PCP. [5+5+6]
4. What is Chomsky Normal Form? Convert the following Context Free Grammar to Chomsky Normal Form.
   S→AaB / aaB
   A→ ε
   B→ bbA /ε [16]
5. (a) Construct a grammar G generating {xx | x ε {a, b}*}
   (b) Construct a grammar generating L = {wcw^R | w ε {a, b}* } [8+8]
6. Design Turing Machine for L = { a^n b^n c^n | n $\geq$ 1 } [16]
7. (a) Give NFA accepting the set of all strings of 0's and 1's such that the 10th symbol from the right is a 1.
   (b) Give DFA accepting the set of all strings with 3 consecutive 0's over the alphabet $\{0, 1\}$.
   (c) Define Finite Automata. Give an example. [6+6+4]
8. (a) Give regular expression for representing the set L of strings in which every 0 is immediately followed by at least two 1's
   (b) Construct a FA equivalent to the regular expression (0 + 1) * (00+11)(0+1)* [8+8]

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