M.Sc. 2nd Semester Examination, 2013

FA

PAPER—202

Full Marks : 50

Time : 2 hours

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable
Illustrate the answers wherever necessary

MODULE – I

( Finite Automata )

[Marks : 25]

Answer any two questions : \( 10 \times 2 \)

1. (a) Construct a DFA accepting all strings \( w \) over \( \{a, b\} \) such that the number of \( b \)'s in \( w \) is \( 2 \mod 3 \).

(b) Construct a Moore machine equivalent to the mealy Machine given below:

(Turn Over)
2. (a) Construct a Grammar generating

\[ L = \{ wCw^T \mid w \in \{a, b\}^* \}. \]

(b) What do you mean by Regular Expressions? Give examples.

(c) Construct a regular expression corresponding to the state diagram described by the following F.A.

![State Diagram]

\[ \rightarrow q_1 \]

\[ \rightarrow q_2 \]

\[ \rightarrow q_3 \]
3. (a) Show that the set \( L = \{ a^i^2 \mid i \geq 1 \} \) is not regular.

(b) Find a reduced grammar equivalent to the grammar \( G \) whose productions are:

\[
S \rightarrow AB \mid CA, \ B \rightarrow BC \mid AB, \ A \rightarrow a, \ C \rightarrow aB \mid b
\]

4. (a) Construct an equivalent finite automata:

\[
ba + (aa + b) \ a^*b
\]

(b) Write a short note on Chomsky classification of grammars.

\[ \text{[Internal Assessment : 5 Marks]} \]

MODULE II

(Compiler Design)

\[\text{[Marks : 25]} \]

Answer any two questions: \( 10 \times 2 \)

1. (a) Consider the following grammar:
$S \rightarrow Aa \mid Bb \mid cC$

$C \rightarrow Aa \mid Ba$

$A \rightarrow D$

$B \rightarrow D$

$D \rightarrow \varepsilon.$

Construct LL(1) parsing table. Is the grammar LL(1)? Why or why not?

(b) Consider the following grammar:

$S \rightarrow aAb$

$A \rightarrow Aa \mid \varepsilon$

Design SLR(I) parser for the grammar of the grammar. If LALR(I) parser is designed for this grammar. How many states the LALR(I) parser will have?

2. (a) Define token, pattern and lexemes also give examples.

(b) Explain the meaning of handle. "If the grammar is ambiguous then there exist exactly one handle for each right sentential form". —Comment.
3. (a) Construct DFA for the regular expression 
\((a/b)^* \text{abb #}\) 

(b) Why LR parsing is attractive? What is annotated parse free? Give one example. 

4. (a) Generate three address code for: 

\[
\text{if } a < b \text{ then }
\]
\[
\text{while } c > d \text{ do }
\]
\[
\text{ } x = x + y
\]
\[
\text{else }
\]
\[
\text{do } p = p + q
\]
\[
\text{while } l <= f
\]

(b) What is basic block? How partitioned the basic block? What is flow graph? Give example.

[Internal Assessment: 5 Marks]