2011

M.Sc.

2nd Semester Examination

THEORY OF COMPUTATION & COMPILER

PAPER—CS-202

Full Marks : 40

Time : 2 Hours

The questions are of equal value.

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

MODULE—1

(FINITE AUTOMATA)

(*Marks : 20*)

Answer any *two* questions.

1. (a) What are mealy and Moore machine? 5

(b) Convert the following Mealy machine into equivalent Moore machine of fig. 1

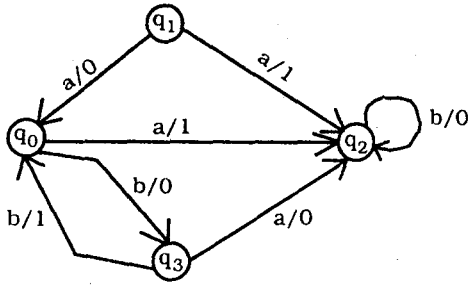


Fig : *1*

2. (a) Explain pumping Lemma for regular set. 5

(b) Show that 5

$L = \{0^i 1^i / i \geq 1\}$ is not regular using pumping Lemma.

3. (a) What is ambiguity? Show that $S \rightarrow aS/Sa/a$ is an ambiguous grammar. 5

(b) Convert the given gr. in CNF 5

$S \longrightarrow ABa$

$A \longrightarrow aab$

$B \longrightarrow Ac$

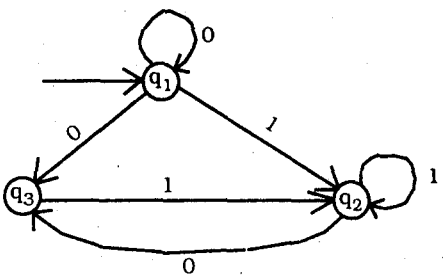
4. (a) Consider the production :

$BC \longrightarrow CB$

Is this production type 1 ? Justify. 2

(b) State and prove Arden's theorem. 1+2

(c) Construct a R.E. corresponding to the state diagramme given, below : 3



(d) Construct a deterministic finite automaton equivalent to the grammar :

$S \longrightarrow aS/bS/aA$

$A \longrightarrow bB$

$B \longrightarrow aC$

$C \longrightarrow \Lambda$ 2

5. (a) Construct a PDA accepting the set of all string over {a, b} with equal no. of a's and b's. 5

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

$S \longrightarrow AB/CA$

$B \longrightarrow BC/AB$

$A \longrightarrow a$

$C \longrightarrow aB/b$ 3

(c) Find a derivation tree of $a*b + a*b$ given that $a*b + a*b$ is in L(G) where G is given by :

$S \longrightarrow S + S/S*S$

$B \longrightarrow a/b.$ 2

MODULE—2

(COMPILER DESIGN)

(Marks : 20)

Answer any *two* questions.

1. (a) Generate three address code for the following program :

While (A < C and B > D) do if A = 1 then C = C+1

else

While A < = D do

A = A + 3 5

(b) Construct DAG for the basic block whose code is given below :

$t1 = b + c$
$t2 = d * e$
$t3 = t2 * t1$
$t3 = t3 * f$
$X = t1 - t3.$ 5

2. What is an LL(1) grammar ? Fill in the entries in an LL(1). Passing table for the following grammar 2

$S \longrightarrow A !$
$A \longrightarrow cBdB / ! B$
$B \longrightarrow aB / b / dA$

Illustrate how the table can be used to control a non-recursive parser by parsing the sentence cabdd ! ab ! 10

3. (a) Consider the following context free grammar $G = (\{S, A, B\}, S, \{a, b\}, P)$ where P is

$S \longrightarrow Aa$
$S \longrightarrow bAc$
$S \longrightarrow Bc$
$S \longrightarrow bBa$
$A \longrightarrow d$
$B \longrightarrow d$

Show that the grammar is LR(1) and not LALR(1). 10

4. Write short notes on (any *two*) : 5×2

(a) Synthesised and inheretated atrribute.

(b) Construction of DFA from regular expression.

(c) LEX.

(d) Type checking.
