53 (IT 503) THCP

2016

THEORY OF COMPUTATIONS

Paper : IT 503

Full Marks : 100

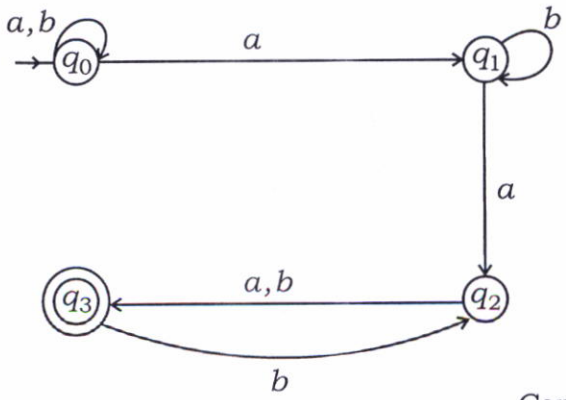
Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **five** questions.*

1. *(a)* Explain the difference between NFA and DFA with suitable example. 5

(b) Construct a DFA equivalent to the following NFA. 10



(c) What is a Moore Machine ? 5

2. (a) Construct a PDA accepting by empty store the following language. 10

$$a^n b^m a^n$$

(b) Construct a PDA equivalent to the following CFG :

$$S \rightarrow OBB,\ B \rightarrow OS \mid 1S \mid O.$$

Test whether 010^4 is in $N(A)$. 10

3. (a) Reduce the following grammar to CNF : 10

$$G = (\{S\}, \{a,b,c\}, \{S \rightarrow a \mid b \mid cSS\}, S)$$

(b) Find a reduced grammar equivalent to the grammar.

$$S \rightarrow aAa,\ A \rightarrow bBB,\ B \rightarrow ab,\ C \rightarrow aB.$$

10

4. (a) What is an ambiguous CFG ? Show that the grammar 10

$S \rightarrow a \mid ab5b \mid aAb$, $A \rightarrow bS \mid aAAb$ is ambiguous.

(b) Construct the CFG generating the following languages : 5+5

(i) The set of all strings over $\{a,b\}$ consisting of equal numbers of a's and b's.

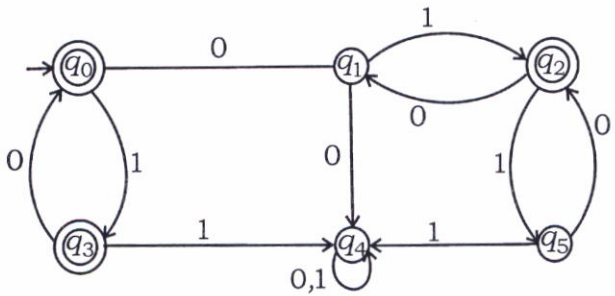
(ii) $L=\{a^n/n>=0\}$

5. (a) Define Linear Bounded Automata and Non Deterministic Turing Machine. Explain in brief the difference between them. 5+5=10

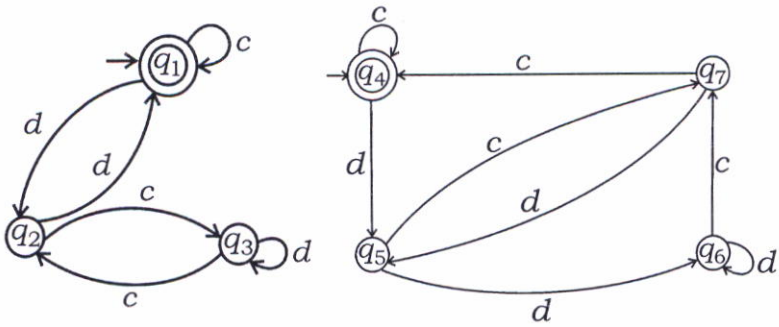
(b) Construct the computation sequence for strings 1213, 312, 112233 for the Turing Machine given below : 10

Present State	Input Tape Symbol			
	1	2	3	b
$\rightarrow q_1$	bRq_2			bRq_1
q_2	$1Rq_2$	bRq_3		bRq_2
q_3		$2Rq_3$	bRq_4	bRq_3
q_4			$3Lq_5$	bLq_7
q_5	$1Lq_6$	$2Lq_5$		bLq_5
q_6	$1Lq_6$			bRq_1
(q_7)				

6. *(a)* Construct a minimum state automaton equivalent to the DFA given below : 10



(b) Find whether the following DFA's are equivalent 10



7. Write short notes on : 10×2=20

(a) Chomsky Classification of Language.

(b) Pumping Lemma for Regular Languages.