B.E. (Fifth Semester) EXAMINATION, May/June, 2006

(Computer Science & Engg.)

THEORY OF COMPUTATION

(CS–505)

Note : Attempt any *five* questions. All questions carry equal marks.
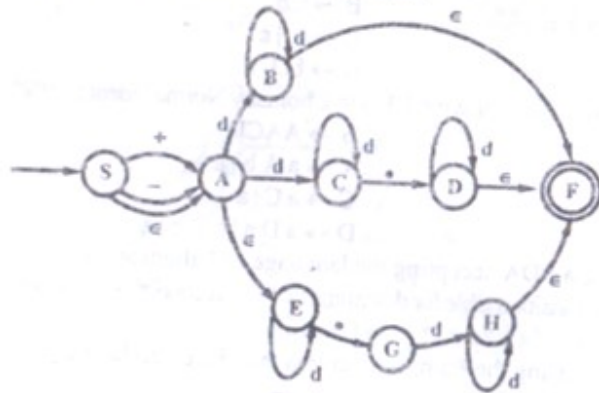
1. (a) Convert the given NDFA machine into DFA.

Fig. 1

where :

$A = (\{S, A, B, C, D, E, F, G, H\}, \{+, -, ., d\}, \delta, S, F)$ E is empty transition.

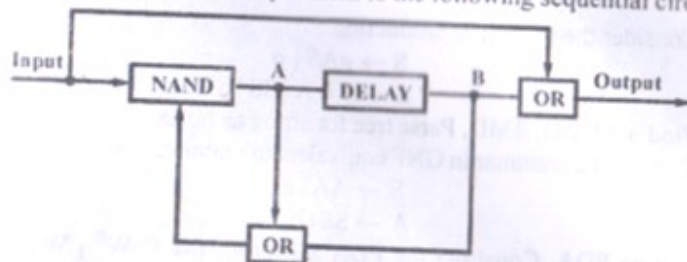(b) Draw a Melay machine equivalent to the following sequential circuit.

Fig. 2

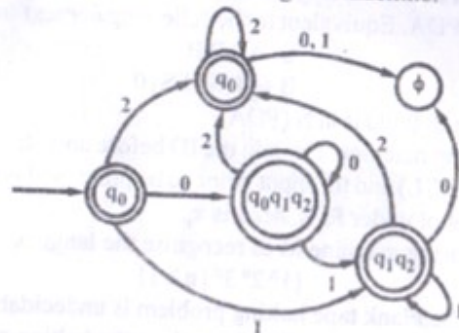2. (a) What is minimization ? Minimize the given machine.

Fig. 3

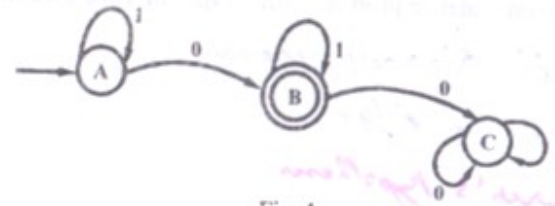(b) Find out the Regular Expression for given machine and derive the theorem used.

Fig. 4

3. (a) Construct a FSM that accepts the sentences in the language specified by the grammer :

$$A \rightarrow 0A$$
$$A \rightarrow 1B$$
$$B \rightarrow 0C$$
$$B \rightarrow 0D$$
$$C \rightarrow 0$$
$$C \rightarrow 1B$$
$$C \rightarrow 1D$$
$$D \rightarrow 1$$
$$D \rightarrow 1A$$

(b) Consider the following production :

$$S \rightarrow aAS \mid a$$
$$A \rightarrow SbA \mid SS \mid ba$$

Find out LMD, RMD, Parse tree for string aa bb aa.

4. (a) Construct a grammar in GNF equivalent to grammar :

$$S \rightarrow AA \mid a$$
$$A \rightarrow SS \mid b$$

(b) Define PDA. Construct the PDA accepting $\{W C W^R \mid W$ in $(0 + 1)^*\}$ by empty stack. Take input as 001 C 100.

5. (a) Construct a PDA accepting $\{a^n b^m a^n \mid m, n \geq 1\}$ by empty store.

(b) Construct a PDA. Equivalent to the following context free grammer :

$$S \rightarrow 0BB$$
$$B \rightarrow 0S \mid 1S \mid 0$$

Test whether 010000 is in N (PDA).

6. (a) Define Turing machine. Explain the ID before and after processing of x_i for $\delta(q, x_i) = (P, Y, L)$ and the input string to be processed is $x_1, x_2, ..., x_n$ and the present symbol under R/W head is x_i.

(b) Design a Turing machine M to recognise the language :

$$\{1^n 2^n 3^n \mid n \geq 1\}$$

7. (a) Prove that the blank tape halting problem is undecidable.

(b) Prove that there exists no TM that solves the halting problem.

8. Write short notes on any *two* of the following :

(a) Ambiguity in grammar   (b) Chomsky hierarchy

(c) Post correspondance problem   (d) Types of Turing machine