Code No. : 3062

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I Semester (Main) Examination, December 2010

THEORY OF AUTOMATA

Time : 3 Hours] [Max. Marks : 75

*Note : Answer **all** questions from Part – A. Answer **any five** questions from Part – **B**.*

PART – A **(25 Marks)**

1. Give any two applications of FA. **2**

2. Draw a DFA for :

   The set of all strings over the alphabet {a, b} with different first and last letters. **3**

3. State the pumping lemma for regular sets. **3**

4. What is ambiguous grammar ? Give an example. **4**

5. Give the properties of CFL's. **2**

6. Define Greibach Normal Form. **2**

7. Define Turing machine. **3**

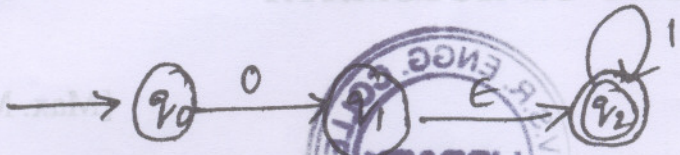
8. What is a recursively enumerable language ? **2**

9. What is meant by undecidability ? **2**

10. What is Restricted Turing machine ? **2**

PART – B (5×10=50 Marks)

11. a) Convert the following NFA with E–moves to NFA without E–moves. 5



b) Construct an NFA with E–moves for the regular expression (00+11)0*. 5

12. a) Show that the following language is not regular

$L = \{ a^{n^2} / n \geq 1 \}$ 4

b) Minimize the following DFA whose δ is given by 6

	0	1
→ q_0	q_1	q_3
q_1	q_2	q_4
q_2	q_1	q_4
q_3	q_2	q_4
* q_4	q_4	q_4

13. a) Consider the grammar G=(V, T, P, E) where 5

$P = \{E \to I, E \to E * E, E \to E + E,$
$E \to (E)$
$I \to a \mid b \mid c\}.$

Check whether the above grammar is ambiguous or not.

b) Construct a PDA equivalent to the grammar 5

$S \to aAA$
$A \to as \mid bs \mid a \cdot$

14. a) Convert the following grammar into chomsky normal form **5**

$S \rightarrow aAbB$

$A \rightarrow aA / a$

$B \rightarrow bB / b$

b) Design a PDA for the language $\{a^n b^{2n} / n \geq 1\}$. **5**

15. Design a turing machine that computes proper substraction function defined by **10**

$m - n = m - n \quad \text{if } m \geq 0$

$= 0 \quad \text{if } m < n$

16. a) Briefly explain about various types of Turing Machines. **6**

b) Write the Membership algorithm (CYK algorithm) for content free grammars. **4**

17. Write short notes on **10**

a) Closure properties of CFLs.

b) Post – correspondence problem.

c) Universal Turing Machine.