Code No. 3062

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I-Semester (Supplementary) Examination, June/July 2011

THEORY OF AUTOMATA

Time : Three Hours] [Maximum Marks : 75

Answer **ALL** questions from Part-A.

Answer any **FIVE** questions from Part-B.

PART—A (Marks : 25)

1. Distinguish between DFA and NFA. 3
2. Define regular expression and give two examples. 3
3. Define Epsilon-closure of a state. 2
4. What is Chomsky normal form ? Give one example. 3
5. State the pumping lemma for content free languages. 3
6. Define push down Automata. 2
7. List various types of Turing machine. 2
8. What is linear bounded automata ? 2
9. Define LR(K) grammars. 2
10. What is post corresponds problem ? Give one example. 3

PART—B (Marks : 5×10=50)

11. (a) Construct a DFA equivalent to the following NFA :

$M = (\{q_0, q_1, q_2, q_3\}, \{0, 1\}, \delta, q_0, \{q_3\})$

where δ is given by :

	a	b
q_0	$[q_0\ q_1]$	q_0
q_1	q_2	q_1
q_2	q_3	q_3
q_3	—	q_2

5

(b) Construct an $\in$-NFA for the regular expression $01^* + 1$. 5

12. Find the minimum state automata for the following DFA :— 10

	a	b
$\rightarrow q_0$	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) Show that the following grammar is ambiguous :—

$S \rightarrow aSb \mid SS \mid \in$. 5

(b) Construct a PDA equivalent to the following grammar :—

$S \rightarrow AA/a$

$A \rightarrow SA/b$. 5

14. Convert the following grammar into Greibach normal form :—

$S \rightarrow AA/a$

$A \rightarrow SS/b$. 10

15. (a) Show that the following language is not a CFL :—

$\{0^i1^j / j = i^2\}$. 5

(b) Design a Turing machine to accept the language :

$L = \{a^nb^n / n \geq 1\}$. 5

16. Consider the CFG :

$S \rightarrow A_1A_2 \mid A_2A_3$

$A_1 \rightarrow A_2A_1 \mid 0$

$A_2 \rightarrow A_3A_3 \mid 1$

$A_3 \rightarrow A_1A_2 \mid 0$

and using the CYK algorithm test 10010 is a member or not. 10

17. Write short notes on :

(a) Recursively enumerable languages

(b) Halting problem

(c) Restricted Turing machines. 10