Roll No. ....

2119

B. E. 4th Semester (CSE)

Examination – May, 2011

THEORY OF AUTOMATA& COMPUTATION

Paper : CSE-206-E

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

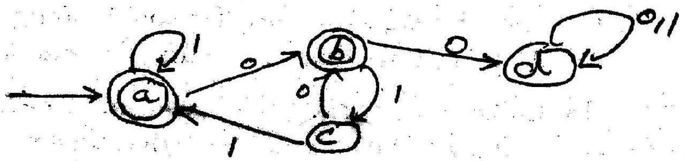
Note : Attempt *five* questions in all. All questions carry equal marks.

1. (a) Prove the formula : 6

$$(aa^* bb^*)^* = \wedge + a(a + b)^* b$$

(b) Let x be a string in $\{0, 1\}^*$ of length n. Describe an FA that accepts the string x and no other strings. How many states are required. 16

(c) For the following FA show that there cannot be another FA with fewer states accepting the same language 8



2. (a) Write and discuss Arden's method for converting NFA to DFA. 10

(b) By taking suitable example prove the equivalence of Moore and Mealy machines. 10

3. Using the concept of pumping Lemma prove that the following languages are non-regular.

(i) $L = \{0^n 1^m / 1 \leq n \leq m\}$

(ii) $L = \{ww / w \text{ is in } (0+1)^*\}$

(iii) $L = \{0^{i^2} / i \geq 1$

4. (a) Write the procedure to remove all the unit productions from the grammar ? Apply this to remove unit productions from the following grammar. 10

$S \rightarrow Aa / B, \; B \rightarrow A / bb$

$A \rightarrow a / bc / B$

(b) Convert the following grammar to Chowmsky Normal form 10

$S \rightarrow ABa, \; A \rightarrow aab, \; B \rightarrow Ac$

5. Design a PDA to convert an infix expression to pastfix expression. Iterate it with suitable example. 20

6. (a) If a language $L = G(M)$ for some tuning machine M, then prove that L is recursively enumerable. 10

(b) Construct a Turing *mk* which computes 2" given n as input, when n is non-negative integer. 10

7. (a) Find unrestricted grammars to generate the following languages.

(i) $\{a^n b^n a^n b^n / n \geq 0\}$

(ii) $\{ss^r s / s \in \{a, b\}^*\}$

(b) Write and briefly explain the characteristics of each class of grammars classified according to Chowmsky Hierarchy. 10

8. (a) Define the following : 20

(i) Recursive Function

(ii) Partial Recursive Function

(iii) Primitive Recursive Function

(b) Prove that the following functions are primitive recursive :

(i) Concatenation,

(ii) Transpose,

(iii) Identity.