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B. Tech. 5th Semester (F) Scheme (CSE)

Examination, December-2018

THEORY OF AUTOMATA AND COMPUTATION

Paper-CSE-305-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Question No. 1 is compulsory. Attempt five questions in total selecting one question from each of the four sections.

1. (a) What are limitations of FSM? 5×4
- (b) Define DFA and N DFA mathematically.
- (c) Define Decidability.
- (d) Define PCP.
- (e) Define Computability

Section-A

2. (a) For the following non-deterministic finite automata, make equivalent deterministic finite automata. 10,10

	a	b
→ q ₀	q ₀ , q ₁	q ₂
q ₁	q ₀	q ₁
q ₂	-	q ₀ , q ₁

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- (b) Prove that regular sets are closed under concatenation.

or

3. What are Mealy/Moore machines ? Explain, can these machines work like one another ? If yes, then explain with an example to convert Moore to Mealy machine. 20

Section-B

4. (a) What do you mean by Pumping Lemma and applications of pumping Lemma ? Using that concept of pumping lemma prove that the language $L = \{a^n b^{2n} \mid n \geq 1\}$ 14,6
- (b) What do you mean by ambiguity ? How do you mean to say a grammar is ambiguous ?

or

5. (a) What do you mean by Reduced form of a CFG ? Explain with example. 8,12
- (b) What are normal forms of CFG ? Explain convert a CFG into CNF.
- $S \rightarrow AACD, A \rightarrow aAba, D \rightarrow aDa \mid bDb \mid d$
 $C \rightarrow aCIC.$

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Section-C

6. Construct a PDA accepting $\{a^n b^m a^n \mid m, n \geq 1\}$ by null store. Construct the corresponding CFG accepting same set. 20

or

7. (a) Design a TM for subtraction for $m-n$, where $m > n$ and both $m, n \geq 1$. 10,10
- (b) Write short note on Halting Problem of TM.

Section-D

8. What are Primitive Recursive Functions ? Explain and prove that the following functions are primitive recursive : (i) Transpose (ii) Concatenation (iii) Union. 20

or

9. Write and briefly explain the characteristics of each class of grammar classified according to Chomsky hierarchy Determine the type of grammar G :
- (i) $S \rightarrow aA, A \rightarrow aAB, B \rightarrow b, A \rightarrow a$
- (ii) $S \rightarrow aAB, AB \rightarrow C, A \rightarrow b, B \rightarrow AB.$

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