_Fifth__ SEMESTER

B.Tech [IT]

[Reappear]

Supplementary

END-SEMESTER EXAMINATION

Feb-2019

IT 301 THEORY OF COMPUTATION

Time: 3:00 Hours

Max. Marks : 50

174-1

> **Note :** Answer any five questions out of seven
> Assume suitable missing data, if any.

Q.1 State the Pumping Lemma for context free languages. Apply this Lemma for determining whether the following language is context free or not.

$$L=\{a^m b^m c^{2n}; \ m,n>0\} \qquad (10)$$

Q.2 For the following grammar productions of a language L,

$S \to AB$

$A \to AD$

$D \to ab$

$B \to c$

$A \to d$

a) Write the alphabet of this grammar.

b) For any one example string that is a member of this language, conduct the CYK membership test to verify that this string is indeed generated by this grammar.

c) Convert the given grammar into Greibach Normal Form

d) Convert the given grammar into Chomsky Normal Form

$(1+5+2+2)$

Q.3 Construct the Turing Machine that can perform addition of two numbers. Construct both the state diagram and the state table.

(10)

Q.4 Construct a Push Down Automata that accepts the language $L=\{a^n c^{3n+2}; \ n>0\}$. Trace a sample string through this machine.

(10)

Q.5 For the grammar: $S \to aT \quad T \to cT \quad T \to aS \quad S \to a$

a) Define the language generated by this grammar

b) Construct the DFA for this language

c) Write the derivation for any one sample string that belongs to this language.

$(2+5+3)$

Q.6 a) Prove the closure properties of context free languages using an example each.

b) Differentiate between recursive and recursively enumerable languages using examples.

$(5+5)$

Q.7 Explain the following in brief using a suitable example each:

[a] Context sensitive grammar and its automata

[b] Closure property for regular languages

$(5+5)$