DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY

B.TECH. SEMESTER VI [Information Technology]

SUBJECT: Theory of Automata and Formal Language (IT-511)

Examination	: Block - Repeater	Seat No.	:
Date	: 19 /11/2018	Day	:
Time	: 11:00 to 12:15 pm	Max. Marks	: 36

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

(a) Prove that if L1 and L2 are CFL but L1' and L1 ∩ L2 are not CFL. [03]

(b) Prove that product of two odd integer is Odd using direct constructive method. [03]

(c) If A is set of real numbers so $\mathbf{2}^{\wedge \mathbf{A}}$ is countable / uncountable and infinite /finite. Justify your answer wit proper reason. [03]

(d) Give Context free grammar for L={ $\mathbf{a}^{\wedge \mathbf{i}}\mathbf{b}^{\wedge \mathbf{j}}\ \mathbf{c}^{\wedge \mathbf{k}}$ | i, j, k ≥ 0, and i = j or i = k } [03]

Q.2 Attempt following questions.(any two)

(a) Design PDA for L = { $\mathbf{a}^{\wedge \mathbf{2n}}\ \mathbf{b}^{\wedge \mathbf{3n}}$ | n ≥ 0 } [06]

(b) Draw DFA for given two language. [06]
L1 = { w ∈ Σ∗ | w = saba for some string s ∈ Σ∗ }
L2 = { w ∈ Σ∗ | na(w) ≥ 2, nb(w) ≤ 1 }

(c) State and explain kleene's theorem part1. [03]
[03]

Q.3 (a) Design TM for reverse of string. For example i/p aabb |- o/p bbaa. [05]
Trace for given above example. [03]

(b) Define Chomsky Hierarchy and relation between grammar. [04]

OR

Q.3 (a) Design TM for L={$\mathbf{a}^{\wedge \mathbf{n}}\ \mathbf{b}^{\wedge \mathbf{n}}\ \mathbf{c}^{\wedge \mathbf{n}}$ | n>=0}. Trace for string aabbcc and aabc. [05]
[03]

(b) Describe unrestricted grammar using one example and differentiate between unrestricted grammar and CSL. [04]