VICTORIA UNIVERSITY BANGLADESH

Assignment On

Course Name : Theory of Computing

Course code : CSI-317

Submitted By	Submitted To
Name: MD. Abir Hossain Reg: 2219150051 Batch: 15th Program: B.sc in CSE	Renea Chowdhury Shormi Department of CSE/CSIT Lecturer Victoria University Of Bangladesh

Ans to the Q. NO - 3(b)

⇒ Difference between regular language and context-Free language.

RLs	CFLs
* Regular exprs.	* ~~Context-free language~~ context-Free grammar.
* or	
* = DFSMs	* = NDPDAs
* Recognize	* ~~parse~~ parse.
* minimize FSMs	* Find and unambiguous gramm
	* Reduce nondeterminism in PDAs
	* find effient parsers
* closed under :	* closed under
• concatenation	* concatenation
* union	* union
* Kleene star	* Kleene star
* Complement	
* intersection	* intersection w/reg langs
* pumping theorem	* pumping theorem
* D = ND	* D ≠ ND

Ans. to the Q. No - 5(a)

Definition of Turing machine: A Turing machine consists of the following.

① An Alphabet Σ of input letters.

② An input ~~Tape~~ Tape partitioned into cells, having infinite many locations in one direction. The input string is placed on the Tape starting its first letter on the cell. 1, the rest of the Tape is initially filled with blanks (Δ's).

Ans. to the Q.NO - 3 (a)

a) The Chomsky hierarchy, as orginally defined by Noam Chomsky, comprises four types of languages and their ~~ass-oci~~ associated grammars and machine.

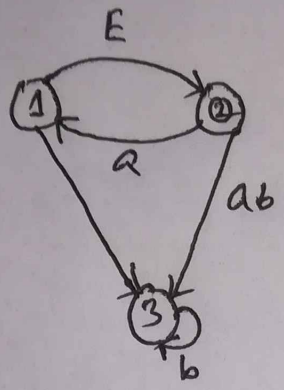
language	Grammar	machin	Example
Regular language	Regular grammar * Right-linear grammar * Left-linear grammar	~~Det~~ Deterministic or nondeterministic finit-state acceptor	a^*
context-~~sensitive~~ Free language	context-free grammar	Nondeterministic pushdown automation	$a^n b^n$
context-sensitive language	context-sensitive grammar	Linear-bounded automation	$a^n b^n c^n$
Recursively	enumerable language	~~unrestricted grammar~~ Turing machine	Any computable function

This languages from a strict hierarchy; that is:

Regular language ⊂ context-Free languages ⊂ context-sensitive language ⊂ recursively enumerable language

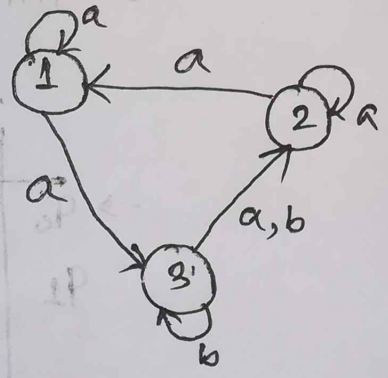
Ans. to the, Q No - 1(b)

b) Given NFA Fig:



Transition Table :-

1	a ,	b
1	1,3	ϕ
2	2,1	ϕ
3	2 ,	2,3



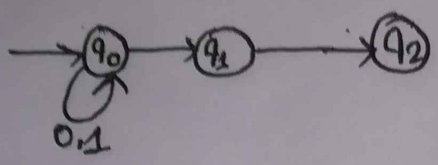
Ans to the Q (1 c)

a) Non-Terminal are syntactic variables that denot sets of strings. The Non-Terminals define sets of strings that help define the language generated by the grammar, a set of token, known as Terminal symbols (Σ). Terminals are the basic symbols from which strings are formed.

Ans. to the Q.No-1(a)

Q

NFA that ends with 01 —



Here,

$Q = \{q_0, q_1, q_2\}$

$\Sigma = \{0, 1\}$

$F = \{q_2\}$

q_0 = initial state,

	0,	1
→ q_0	q_0, q_1	q_0
q_1	ϕ	q_2
	ϕ	ϕ

Ans to the Q.No-4(b)

b) Build a DFA for the following language:
$L = \{w | w$ is a bit string which contains the substring $11\}$

* Start Design:

* q_0: start state (initially of), also means the most recent input was not a 1.
* q_1: has never seen 11 but the most recent input was a 1.
* q_2: has seen at least once