victoria university of Bangladesh

Final Examination

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course title ÷ theory of computing

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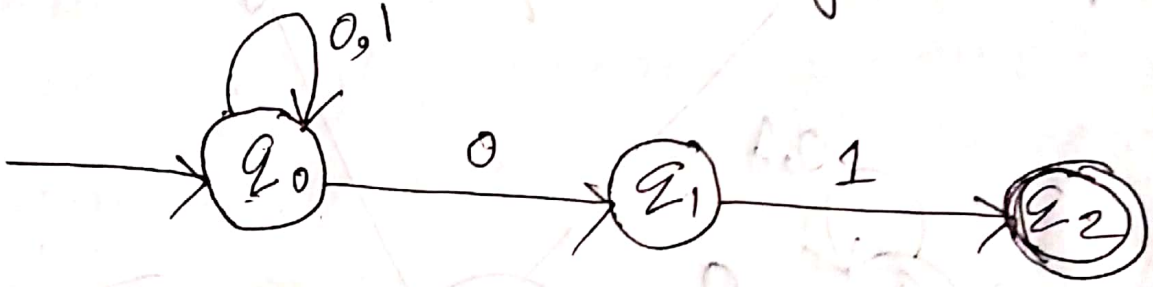
Ans to the Qu. No: 1

(1) (a)

Build an NFA for the following language:

$L = \{w \mid w$ is a binary string ends in $01\}$



Here,

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

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

$F = \{q_2\}$

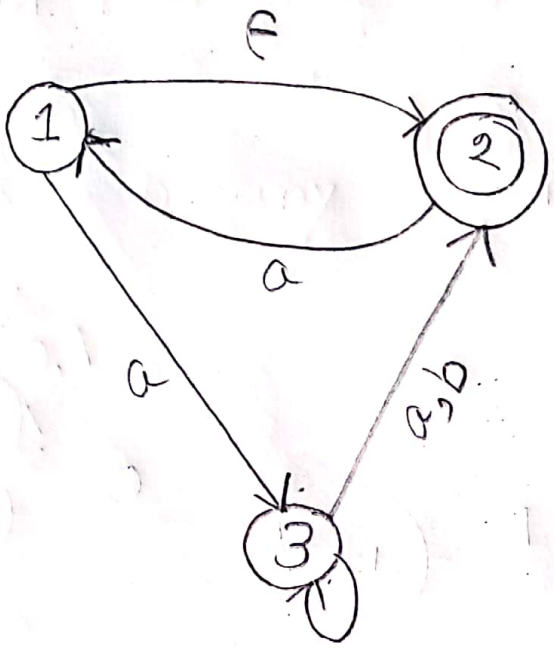
q_0 = initial state

transition (δ) is showing here,

	0	1
q_0	q_0, q_1	q_0
q_1	$\emptyset$	q_2
q_2	$\emptyset$	$\emptyset$

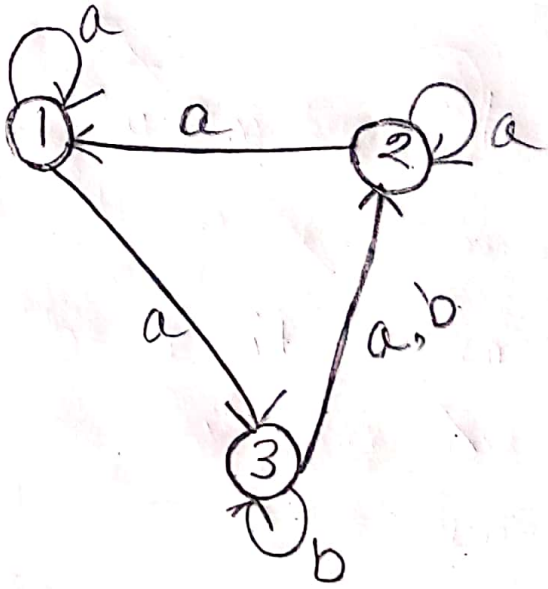
(1) (b)

Given NFA Fig →



Transition table-

	a	b
1	1,3	ϕ
2	2,1	ϕ
3	2	2,3



(1) (c)

Non-terminal

In computer science, terminal and nonterminal symbols are the lexical elements used in specifying the production rules constituting a formal grammer. terminal symbols are the elementary symbols of the language defined by a for grammar.

Ans to the Qu.No: 3

(3) (a)

chomsky's hierachy in terms of their relationship, grammer, and machine.

Language	Grammar	Machine	Example
Regulare language	Regular grammer • Right-linear grammer • Left-linear grammer	Deterministic or nondeterministic finite-state accepto	a^*
context-free language	context-free grammer	Nondeterministic pushdown automaton	$a^n b^n$
context-sensitive language	context-sensitive grammer	Linear-bounded automation	$a^n b^n c^n$
Recursively enumerable language	Unrestricted grammer	Turing machine	Any computable function

(3) (b)

The differences between regular language and context-free language :-

A regular language can be recognized by a finite automaton. A context-free language requires a stack, and a context sensitive language requires two stacks (which is equivalent to saying it requires a full Turing machine).

(N, Σ, P, S) : terminals, nonterminals, productions, starting state terminal symbols.

Elementary symbols of the language defined by a formal grammar.

Ans to the ques no: 5

(5) (a)

Turing machines, first described by Alan Turing in Turing 1936-7, are simple abstract computational devices intended to help investigate the extent and limitations of what can be computed. Turing's 'automatic machines', as he termed them in 1936, were specifically devised for the computing of real numbers.

(5) (c)

The pop() method removes and returns the top element of the stack. An EmptystackException is thrown if we call the pop() method on an empty-stack. peek(): The peek() method returns the element on the top of the stack but does not remove it.

Ans to the qu.no: 2

(2) (a)

Ambiguity and CFG

In computer science, an ambiguous grammar is a context-free grammar for which there exists a string that can have more than one leftmost derivation or parse tree, while an unambiguous grammar is a context-free grammar for which every valid string has a unique leftmost derivation or parse tree.