University of Mumbai
Examination June 2021

Examinations Commencing from 1ˢᵗ June 2021
Program: **INFORMATION TECHNOLOGY**
Curriculum Scheme: Rev 2019
Examination: SE Semester IV
Course Code: ITC 404 and Course Name: AUTOMATA THEORY

Time: 2 hour   Max. Marks: 80

For the students :- All the Questions are compulsory and carry equal marks .

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
Q1.	A finite non empty set of symbols is called a _____
Option A:	alphabet
Option B:	string
Option C:	word
Option D:	grammar
Q2.	Regular Expressions are used for
Option A:	Specifying strings of Context Free Languages
Option B:	Specifying strings of Regular Languages
Option C:	Specifying strings of Enumerable Languages
Option D:	Specifying strings of Recursively Enumerable Languages
Q3.	A formal language is recursive if :
Option A:	A total Turing machine exists
Option B:	A Turing machine that halts for every input
Option C:	Turing machine rejects if the input does not belong to the language
Option D:	All of the mentioned
Q4.	DFA and NFA are represented by how many tuples
Option A:	6
Option B:	5
Option C:	4
Option D:	7
Q5.	The regular Expression for the following language: The set of strings over the alphabet {0,1} starting with 0.
Option A:	(0+1)*1
Option B:	0(0+1)*
Option C:	0*1
Option D:	0*(0+1)*
Q6.	The regular Expression for the following language: The set of strings over the alphabet {0,1} ending in 1.
Option A:	(0+1)*1
Option B:	0(0+1)*

Option C:	0.1*
Option D:	0*(0+1)*
Q7.	According to Chomsky, there are how many types of grammars?
Option A:	2
Option B:	5
Option C:	4
Option D:	3
Q8.	A given grammar is called ambiguous if
Option A:	two or more productions have the same non-terminal on the left hand side
Option B:	a derivation tree has more than one associated sentence
Option C:	there is a sentence with more than one derivation tree corresponding to it
Option D:	brackets are not present in the grammar
Q9.	What is the type of language accepted by a Push Down Automata according to Chomsky's Hierarchy?
Option A:	Type 0
Option B:	Type 1
Option C:	Type 2
Option D:	Type 3
Q10.	Number of tuples used in defining a Grammar:
Option A:	3
Option B:	4
Option C:	5
Option D:	6
Q11.	The entity which generate Language is termed as:
Option A:	Automata
Option B:	Tokens
Option C:	Grammar
Option D:	Data
Q12.	The Grammar can be defined as: G = (V, T, P, S) In the given definition, what does S represents?
Option A:	Accepting State
Option B:	Starting Variable
Option C:	Sensitive Grammar
Option D:	Context Sensitive Grammar
Q13.	Unrestricted grammar is also called_____ Grammar
Option A:	Type 3
Option B:	Type 2
Option C:	Type 1
Option D:	Type 0
Q14.	Context Free grammar is also called_____ Grammar
Option A:	Type 3
Option B:	Type 2

Option C:	Type 1
Option D:	Type 0
Q15.	RLG and LLG are types of which grammar
Option A:	Type 3
Option B:	Type 2
Option C:	Type 1
Option D:	Type 0
Q16.	Restricted grammar is also called Grammar
Option A:	Type 3
Option B:	Type 2
Option C:	Type 1
Option D:	Type 0
Q17.	A pushdown automata is _____if there is at most one transition to each configuration
Option A:	Nondeterministic
Option B:	Deterministic
Option C:	Non finite
Option D:	Finite
Q18.	Halting state of Turing machine are:
Option A:	Start and stop
Option B:	Accept and reject
Option C:	Start and reject
Option D:	Reject and allow
Q19.	According to Chomsky hierarchy, which of the following is recognized by Recursively Enumerable language?
Option A:	Type 3
Option B:	Type 2
Option C:	Type 1
Option D:	Type 0
Q20.	Which of the following problems is solvable?
Option A:	Determining of a universal Turing machine and some input will halt
Option B:	Determining of an arbitrary Turing machine is an universal Turing machine
Option C:	Determining of a universal Turing machine can be written for fewer than k instructions for some k
Option D:	Writing a universal Turing machine

Q2 20 Marks Total	Solve any Two Questions out of Three	10 marks each
A	Construct Moore and Mealy machine to convert each occurrence of 100 by 101 over $\Sigma = \{0,1\}$.	
B	Construct PDA for recognizing the language $L = \{WCW^R \mid W = \{a,b\}$; C is constant; W^R is reverese of W.	
C	Explain phases of compiler in detail.	

Q3. 20 Marks Total	Solve any Two Questions out of Three	10 marks each
A	Construct minimized DFA for $r = (11 + 10)*$	
B	Design a Turing machine for adding binary numbers, Input : B m # n b Output : B p B where p = m + n	
C	Convert CFG in CNF: A ⟶ aBa | bBa B ⟶ aB | bB | ε	