

University of Mumbai

Examination 2020

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016 (Keep the required)

Examination: TE Semester V

Course Code: CSC504 and Course Name: THEORY OF COMPUTER SCIENCE

Time: 2 hour

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In general how many substrings are there in the string "stamp"
Option A:	12
Option B:	16
Option C:	14
Option D:	18
2.	Σ^k is defined as the set of all the strings from the alphabet of length k. What is Σ^k ?
Option A:	power
Option B:	alphabet
Option C:	string
Option D:	substring
3.	a finite non empty set of symbols is called a _____
Option A:	alphabet
Option B:	string
Option C:	word
Option D:	grammar
4.	consider a dfa which accepts strings of length 8. How many strings will it accept of length 7 which begins with 10 over the the $\Sigma=\{0,1\}$.
Option A:	60
Option B:	62
Option C:	128
Option D:	64
5.	construct the re for the statement: strings containing atleast 1 a
Option A:	a*b
Option B:	a*ba*

Option C:	$(a+b)^*a(a+b)^*$
Option D:	b^*
6.	the language of all words with at least 2 a's can be described by the regular expression
Option A:	$(ab)^*a$ and $a(ba)^*$
Option B:	$(a+b)^*ab^*a(a+b)^*$
Option C:	$b^*ab^*a(a+b)^*$
Option D:	all of these
7.	The regular Expression for the following language : <i>The set of strings over the alphabet {0,1} starting with 0.</i>
Option A:	$(0+1)^*1$
Option B:	$0(0+1)^*$
Option C:	0^*1
Option D:	$0^*(0+1)^*$
8.	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
9.	What is the type of language accepted by a Push down Automata according to Chomsky's Hierarchy?
Option A:	Type0
Option B:	Type1
Option C:	Type2
Option D:	Type3
10.	Number of tuples used in defining a Grammar:
Option A:	3
Option B:	4
Option C:	5
Option D:	6
11.	A push down automata is different than finite automata by:
Option A:	Its memory
Option B:	Number of states
Option C:	Both memory as well as states
Option D:	None of these
12.	In definition of PDA $M=(Q, \Sigma, \Gamma, q_0, Z_0, A, \delta)$ what Γ represents?
Option A:	Initial stack symbol
Option B:	Stack alphabet
Option C:	Finite set of states

Option D:	Transition function
13.	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
14.	A PDA machine configuration (q, a, X) can be correctly represented as:
Option A:	(unprocessed input, stack content, current state)
Option B:	(current state, unprocessed input, stack content)
Option C:	(current state, stack content, unprocessed input)
Option D:	none of the mentioned
15.	The language recognized by Turing machine is:
Option A:	Context free language
Option B:	Context sensitive language
Option C:	Recursively enumerable language
Option D:	Regular language
16.	In definition of TM $T=(Q,\Sigma,\Gamma,q_0,\delta)$ what Γ represents?
Option A:	Tape alphabets
Option B:	Input symbols
Option C:	Transition function
Option D:	Initial state
17.	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
18.	Recursive languages are also known as:
Option A:	Undecidable
Option B:	Decidable
Option C:	Sometimes decidable
Option D:	None of the mentioned
19.	If there exists a language L, for which there exists a TM, T, that accepts every word in L and either rejects or loops for every word that is not in L, is called
Option A:	Recursive
Option B:	Recursively enumerable
Option C:	NP-HARD
Option D:	None of these
20.	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	Change the occurrence of abb into aba using a Moore Machine.	
B	Draw an NFA for the RE $(a+b)^*baa^*$ and Convert it to DFA.	
C	What is Pumping Lemma for Context Free Languages? Explain	

Q3. 20 Marks Total	Solve any Two Questions out of Three	10 marks each
A	Design a PDA for Odd Palindromes.	
B	Design a Turing machine for adding unary numbers $m+n$.	
C	Explain the Halting Problem with examples	