University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: **Information Technology**

Curriculum Scheme: Rev 2019

Examination: BE Semester IV

Course Code: ITC404 and Course Name: AUTOMATA THEORY

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which symbol is used to represent a Transition Function of Finite Automata?
Option A:	β
Option B:	δ
Option C:	∑
Option D:	ε
2.	What is the language of Finite Automata?
Option A:	Recursive Language
Option B:	Context-Sensitive Language
Option C:	Regular Language
Option D:	Context-Free Language
3.	Number of states in NFA are
Option A:	Less than or equal to equivalent DFA
Option B:	Less than equivalent DFA
Option C:	Greater than equivalent DFA
Option D:	Greater than or equal to equivalent DFA
4.	What is the correct form of productions in Chomsky Normal Form?
Option A:	A -> aB
Option B:	A - > BC
Option C:	A -> B
Option D:	A -> Ba
5.	The language WW^R is accepted by-
Option A:	Deterministic Pushdown Automata
Option B:	Non-Deterministic Finite Automata
Option C:	Deterministic Finite Automata
Option D:	Non-Deterministic Pushdown Automata
6.	The transition δ (q1,a,a) = (q_f, ε) of PDA is -
Option A:	Performing delete and pop operation
Option B:	Performing delete operation only
Option C:	Performing pop operation only
Option D:	Performing push operation
7.	What is the language of the Turing machine?

Option A:	Regular language
Option B:	Context free language
Option C:	Recursive enumerable language
Option D:	Context sensitive language
8.	What is the limitation of regular grammar?
Option A:	Can generate simple strings
Option B:	Can only describe regular language
Option C:	Can't generate long strings
Option D:	Too difficult to understand
9.	DFA designed to accept strings with no more than 2 a's can accept:
Option A:	a b a b
Option B:	a b a a
Option C:	b a a a
Option D:	a b a b a b a b
10.	The length of Moore machine compared to Mealy machine is:
Option A:	Equal to Mealy machine for given input
Option B:	Smaller than Mealy machine for given input
Option C:	One smaller than Mealy machine for given input
Option D:	One longer than Mealy machine for given input
11.	Derivation process is one which-
Option A:	Parses given string
Option B:	Generates new string
Option C:	Convert string to right linear grammar
Option D:	Convert string to left linear grammar
12.	Language of PDA is:
Option A:	Recursively Enumerable language
Option B:	Regular Language
Option C:	Context sensitive language
Option D:	Context free language
13.	The tuple Σ in Turing machine represents-
Option A:	Tape symbol
Option B:	Output symbol
Option C:	Tape alphabet
Option D:	Input alphabet
14.	A Turing Machine can compute problems which are-
Option A:	Complex
Option B:	Simple
Option C:	Unsolvable
Option D:	Computable
15.	Which of the following languages are most suitable for implementing context free languages?
Option A:	C

Option B:	Perl
Option C:	Assembly Language
Option D:	Compiler language
16.	With reference to the process of conversion of a context free grammar to CNF, the number of variables to be introduced for the terminals are: S->AB0 A->001 B->A1
Option A:	3
Option B:	4
Option C:	2
Option D:	5
17.	Next move function δ of a Turing machine M = (Q, Σ , Γ, δ, q0, B, F) is a mapping
Option A:	δ : Q x Σ --> Q x Γ
Option B:	δ : Q x Γ ---> Q x Σ x {L, R}
Option C:	δ : Q x Σ ---> Q x Γ x {L, R}
Option D:	δ : Q x Γ ---> Q x Γ x {L, R}
18.	Which of the following grammars are in Chomsky Normal Form:
Option A:	S->AB|BC|CD, A->AB B->CD, C->2, D->3
Option B:	S->AB, S->BCA|0|1|2|3
Option C:	S->ABa, A->aab, B->Ac
Option D:	S->ABa, A->AAB, B->Ac
19.	The lexical analysis for a high level language needs the power of which one of the following machine models?
Option A:	Turing Machine
Option B:	Deterministic pushdown automata
Option C:	Finite state automata
Option D:	Non-Deterministic pushdown automata
20.	Which of the following relates to Chomsky hierarchy?
Option A:	Regular<CFL<CSL<Unrestricted
Option B:	CFL<CSL<Unrestricted<Regular
Option C:	CSL<Unrestricted<CF<Regular
Option D:	CSL<Unrestricted< Regular<CF

Q2.	**Solve any Four questions out of Six. 5 marks each**
A	Construct DFA to accept strings that ends with substring 110 for Σ={0,1}
B	Design a Moore machine which counts the occurrence of substring bab in an input string for Σ = {a, b}.
C	Give Regular Expressions for i) For all strings over a,b which contains exactly 3 occurrence of b over Σ={a,b} ii) For all strings over 0,1 that starts with 10 and ends with 01
D	Let G be the grammar having the following set of production. S → ABA, A→ aA | bA | ϵ

	B→ bbb Find LMD and RMD for string “ababbbba”
E	Write Short Note on Chomsky Hierarchy
F	Compare and Contrast between FA, PDA and TM

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Convert the given grammar G to CNF. G: S -> a | aA | B |C , A -> aB | ε , B -> Aa, C -> aCD | a, D -> ddd.
B	Design a Turing Machine for 2’s Complement of a binary number
C	Design PDA for odd length palindrome let Σ = {0, 1}, $L = \{WCW^R\}$ $where$ $W \epsilon \Sigma$ *

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	A
Q4	B
Q5	D
Q6	C
Q7	C
Q8.	B
Q9.	A
Q10.	D
Q11.	B
Q12.	D
Q13.	D

Q14.	D
Q15.	C
Q16.	B
Q17.	D
Q18.	A
Q19.	C
Q20.	A