University of Mumbai
Examinations Summer 2022
Program: Computer Engineering
Curriculum Scheme: Choice Base Credit Grading System Rev2016
Examination: TE Computer Engineering Semester V (Choice Based Credit Grading System)
Course Code: 31904 and Course Name: Theory of Computer Science

Time: 2 hour 30 minutes   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.	Write a Regular expression for string for $\sum = \{0, 1\}$ containing exactly two 0s.
Option A:	1*001*
Option B:	1*01*01*
Option C:	(1+0)*00
Option D:	01*0
2.	FSM is less powerful than TM because
Option A:	It does not have the capability to remember long input sequence
Option B:	It has no finite states
Option C:	It had no single final state
Option D:	It has multiple start state
3.	Context Sensitive grammars are---------grammers.
Option A:	Type 0
Option B:	Type 1
Option C:	Type 2
Option D:	Type 3
4.	A language L is recursively enumerable if and only if it can be enumerated by some
Option A:	Turing machine
Option B:	Finite State Machine
Option C:	Deterministic finite state machine
Option D:	Moore machine
5.	Halting problem is
Option A:	Unsolvable
Option B:	Solvable
Option C:	Depends on problem
Option D:	Depends on TM and UTM
6.	If S---> TaaaT , T---> aT , T---> bT, T---> ^ then the language generated can be given as
Option A:	(a+b)aaa(a+b)
Option B:	(a+b)*aaa(a+b)*
Option C:	aaa
Option D:	(ab)*aaa(ab)*
7.	Which of the following can accept even palindrome over {a,b}
Option A:	FSM
Option B:	DFA
Option C:	NFA
Option D:	Turing Machine

8.	If the grammer is such that every production is of the type A-->aB then the grammer is in -------------
Option A:	Chomsky's Normal form
Option B:	Greibach Normal form
Option C:	Not any normal form
Option D:	Context free form
9.	Identify the correct equation for Arden's Theorem.
Option A:	R = Q + RP has a unique solution: R=Q*P
Option B:	R =Q + RP has a unique solution: R=Q*P*
Option C:	R = Q + RP has a unique solution: R=QP*
Option D:	R = Q + RP has a unique solution: R= (P*Q*) *
10.	The productions of the form A $\rightarrow$ B, is called _____ .
Option A:	Null production
Option B:	Unit production
Option C:	Unique production
Option D:	Useless production

Q2	
A	**Solve any Two** **5 marks each**
i.	Write Short note on Undecidability.
ii.	Define ambiguity in Grammar. Give an example of ambiguous grammar.
iii.	Design a automata accepting strings containing 1101 for $\sum = \{0, 1\}$
B	**Solve any One** **10 marks each**
i.	Convert the following regular expression to DFA (0+1)*(00+11)001
ii.	Design a Moore machines that output modulus 5 when an input is given in Decimal format. Also convert the same into mealy machine

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Explain Turing Machine. Design a TM for $0^n 1^n 2^n \mid n>1$.
B	Reduce the following grammar to Greibach Normal Form S->AB A->a B->C|b C->D D->E E->a
C	Explain and prove Arden's theorem. Find the regular expression for the following automata using Arden's theorem.
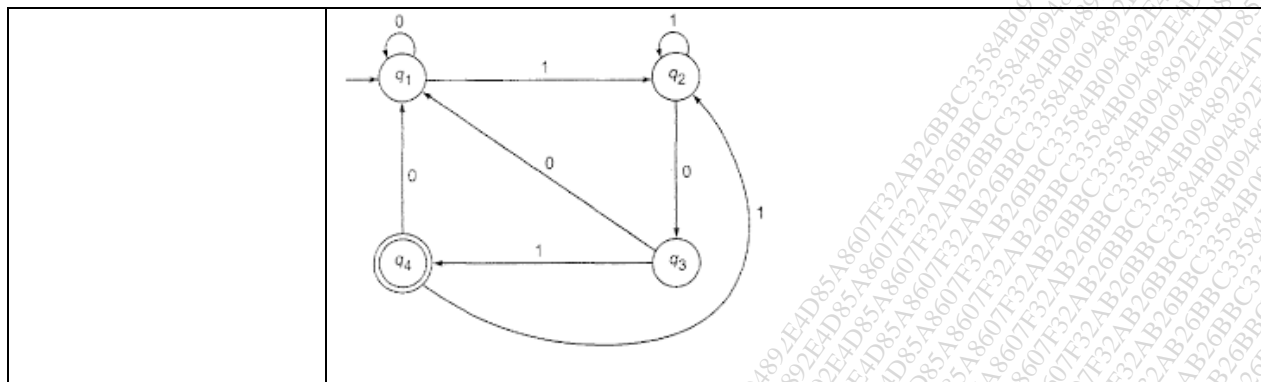
Q4		
A	**Solve any Two**	**5 marks each**
i.	Explain Chomsky's classification of Languages	
ii.	Discuss post correspondence problem with suitable example.	
iii.	Convert following grammar to CNF S->aSab|bSb|aa|bb|a|b	
B	**Solve any One**	**10 marks each**
i.	State pumping lemma for Regular languages. Prove $L = a^p \mid p$ is prime is not regular	
ii.	Design a PDA that accepts following strings $L = (ab)^n c^n \mid n \geq 1$	