

## University of Mumbai

**Program: Computer Engineering Curriculum Scheme: Rev2019**

Examination: Third Year Semester: v

Course Code: CSC501 Course Name: Theoretical Computer Science

Time: 2.30 hours

Max. Marks: 80

Q1. All questions compulsory 2 marks each (20 Marks)

Q1. (20 Marks)	Choose the correct option for following questions.
1.	How many states will be there in FSM to check if any binary number is divisible by 4 or not?
Option A:	3
Option B:	4
Option C:	6
Option D:	5
2.	Which of the following is correct?
Option A:	There is a PDA by final state for every PDA by empty stack.
Option B:	There is a PDA by empty stack for every PDA by final state.
Option C:	Both A and B
Option D:	There is a PDA by null state for every PDA by empty stack.
3.	Which of the following statements are true? <b>Statement 1:</b> Mealy and Moore machine are equivalent in terms of capacity <b>Statement 2:</b> While converting from Mealy to Moore machine, If initial state is splitted then one of the splitted states will become new initial state. <b>Statement 3:</b> For Mealy machine, the output depends on the current input. <b>Statement 4:</b> There exists more number of states in Moore machine as compared to Mealy machine.
Option A:	1 and 2
Option B:	1, 2 and 3
Option C:	1 only
Option D:	1, 2 and 4
4.	If regular expression $(101)^*$ is converted to $\epsilon$ -NFA then how many states will be there in converted $\epsilon$ -NFA?
Option A:	5
Option B:	7
Option C:	8
Option D:	6
5.	Let P, Q and R be the regular expression over given input symbol set and P is not $\epsilon$ (epsilon), then $R = Q + RP$ has a unique solution:
Option A:	$Q^*P$

Option B:	QP*
Option C:	Q*P*
Option D:	(P*Q*) *
6.	If $\Sigma = \{0, 1\}$ . What is $\Sigma^*$ ?
Option A:	$\Sigma = \{0, 1, 00, 01, 10, 11, 000, 001, \dots\}$
Option B:	$\Sigma = \{\epsilon, 0, 1, 00, 01, 10, 11, 000, 001, \dots\}$
Option C:	$\Sigma = \{\epsilon, 0, 00, 000, 0000, 00000, \dots\}$
Option D:	$\Sigma = \{\epsilon, 1, 11, 111, 1111, 11111, \dots\}$
7.	For minimizing DFA which of the following statements are true?
Option A:	<b>Statement 1:</b> We can replace initial state.
Option B:	<b>Statement 2:</b> Any final state can be replaced by other final state only.
Option C:	<b>Statement 3:</b> Any non-final state can be replaced by other non-final state only.
Option D:	<b>Statement 4:</b> We cannot replace initial state.
8.	_____ is Type 2 grammar according to Chomsky Hierarchy.
Option A:	Regular Grammar
Option B:	Context Sensitive Grammar
Option C:	Context Free Grammar
Option D:	Unrestricted Grammar
9.	What do the symbols $\{\Gamma, B\}$ indicate in formal definition of Turing Machine?
Option A:	{input alphabet, Blank symbol}
Option B:	{tape alphabet, Blank symbol}
Option C:	{input alphabet, Stack symbol}
Option D:	{Stack alphabet, Blank symbol}
10.	Which of the following are undecidable problem?
Option A:	Decide Language is regular or not
Option B:	Check Ambiguity
Option C:	Derive Parse Tree
Option D:	Halting Problem

<b>Q2.</b> (20 Marks)	<b>Solve any Two Questions out of Three 10 marks each.</b>
A	What is ambiguous grammar? Check whether following grammar is ambiguous or not $E \rightarrow E+E \mid E^*E \mid (E) \mid id$
B	Design Turing Machine to recognize language, $L = \{a^n b^{n+1} \mid n \geq 1\}$ .
C	Construct DFA equivalent to NFA $(\{p, q, r, s\}, \{0, 1\}, \delta, p, \{q, s\})$ and minimize the given DFA where $\delta$ is

