

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	If L_1 and L_2 are context free language and R is a regular set, then which one of the languages below is not necessarily a context free language?
Option A:	$L_1 L_2$
Option B:	$L_1 \cup L_2$
Option C:	$L_1 \cap L_2$
Option D:	$L_1 \cap R$
2.	A Context Free Grammar $G = (V, T, P, S)$ is said to be in _____, if every productions is of the form : $A \rightarrow \alpha a$ where $a \in T$ is a Terminal and α is a string of zero or more variables.
Option A:	Unit production.
Option B:	Chomsky Normal form.
Option C:	Null production.
Option D:	Greibach Normal form.
3.	Consider the following statements : I : Each Turing Acceptable language is need not to be Turing Decidable. II : Every Turing Decidable is Turing acceptable.
Option A:	Only I is true.
Option B:	Only II is true.
Option C:	Both are false.
Option D:	Both are true.
4.	FSM can recognize :
Option A:	Only Context free grammar
Option B:	Only Context sensitive grammar
Option C:	Only regular grammar
Option D:	Any grammar
5.	Recursively enumerable languages are not closed under :

Option A:	Concatenation
Option B:	Complementation
Option C:	Homomorphism
Option D:	Union
6.	If P , Q , R be the three regular expressions then the equation $R = Q + RP$ has a unique solution given by :
Option A:	$R = RP$
Option B:	$R = QP^*$
Option C:	$R = Q^*P$
Option D:	$R = P^*R$
7.	Every Context free language can not be recognized by a _____ , but it can be recognized by _____.
Option A:	NPDA , DPDA .
Option B:	DPDA , NPDA .
Option C:	NPDA , NPDA .
Option D:	DPDA , DPDA .
8.	If a language is denoted by a regular expression $L = (x)^*(x yx)$, then which of the following is not a legal string within L ?
Option A:	yx
Option B:	xyx
Option C:	x
Option D:	xyxyx
9.	Algorithmically , Which of the following conversion is not possible ?
Option A:	Regular grammar to context-free grammar
Option B:	Non-deterministic PDA to deterministic PDA
Option C:	Non-deterministic TM to deterministic TM
Option D:	Non-deterministic FSA to deterministic FSA
10.	_____ is the Type 1 grammar according to Chomsky Hierarchy.

Option A:	Unrestricted Grammar.
Option B:	Regular Grammar.
Option C:	Context free Grammar.
Option D:	Context sensitive Grammar.

Q2	
A	Solve any TWO 5 marks each
i	Compare and Contrast Moore and Mealy Machine.
ii	Find the GNF equivalent to CFG : $S \rightarrow AB$ $A \rightarrow aA \mid bB \mid b$ $B \rightarrow b$
iii	State and explain pumping lemma theorem for regular languages.
B	Solve any One 10 marks each
i	Give the Moore and Mealy machine for the following processes : "For input from $(0+1)^*$, if inputs ends in 101, output x ; if input ends in 110, output y ; otherwise output z".
ii	Let G be the grammar : $S \rightarrow aB \mid bA$ $A \rightarrow a \mid aS \mid bAA$ $B \rightarrow b \mid bS \mid aBB$ Find : i) Left most derivation ii) Right most derivation iii) Parse tree iv) Is the grammar unambiguous ? , for the given string 00110101.

Q3	
A	Solve any TWO 5 marks each
i	Explain Non-deterministic PDA.
ii	Obtain DFA to accept strings of 0's and 1's with even no. of 0's and even no. of 1's.

iii	Explain halting problem of Turing Machine.
B	Solve any One 10 marks each
i	Design a Turing Machine to accept the language given by a regular expression $0(0+1)^*11$.
ii	Construct the PDA accepting following language : $L = a^n b^m c^n \mid m, n \geq 1$.

Q4	
A	Solve any TWO 5 marks each
i	Explain Chomsky Hierarchy.
ii	Describe Finite State Machine.
iii	Construct left linear and right linear grammar for the regular expression : $((01+10)^*11)^*00$.
B	Solve any One 10 marks each
i	Design a TM which recognizes words of the form $a^n b^n c^n \mid n \geq 1$.
ii	Convert the following RE to ϵ -NFA and then convert it to DFA : $R = ((0+1)^*10 + (00)^*(11)^*)^*$.