

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
Hanuman Vyayam Prasarak Mandals's
College of Engineering & Technology, Amravati
Course: Information Technology
BE Four year Semester (Information technology) Summer 2020 Exam
Subject: 6IT03 Theory of Computation
Assignment for ONLY BACKLOG STUDENTS

Instructions

- 1) Solve ANY TWO Questions
- 2) Each Question Carries 10 marks

Q I) Solve the following

- 1) Construct DFA accepting following languages over alphabet $\{0, 1\}$
 - i) The set of all strings those containing the substring "001" [2M]
- 2) Using Pumping Lemma show that following Languages are not regular
 - i) $L = \{ WW^R / W \in (a,b)^* \}$ [2M]
- 3) Let G be the grammar
$$S \rightarrow aB/bA$$
$$A \rightarrow a/aS/bAA$$
$$B \rightarrow b/bS/Abb$$
For the string **bbaaba**,
Find
 - i) Leftmost Derivation ii) Rightmost Derivation [2M]
- 4) Explain Counter Machine. [2M]
- 5) Give Context sensitive grammar for $L = \{ a^n b^n c^n \mid n \geq 0 \}$ only Productions. [1M]
- 6) Language is said to be CSL
 - a) If there exist context free grammar
 - b) If there exist regular grammar
 - c) If there exist context sensitive grammar
 - d) All of the above [1M]

QII) Solve the following

- 1) Define Deterministic Finite Automata and construct DFA which will accept all numbers divisible by 3. [2M]
- 2) Construct Finite Automata for 011^*+110 [2M]

- 3) Design a PDA for accepting language $L = \{a^n b^{2^n} / n \geq 1\}$ [2M]
 4) Construct Turing machine for Addition [2M]
 5) Explain Chomsky Hierarchy only Diagram [1M]
 6) Show that Union of two recursive languages is also recursive only Diagram [1M]

QIII) Solve the following

- 1) Convert the following NFA into its Equivalent DFA.

$Q \setminus \Sigma$	0	1
$\rightarrow q_0$	$\{q_0, q_1\}$	q_0
q_1	q_2	q_1
q_2	q_3	q_3
$\odot q_3$	-	q_2

[2M]

- 2) Convert the following RLG into equivalent LLG

$S \rightarrow 0A/1B$
 $A \rightarrow 0C/1A/0$
 $B \rightarrow 1B/1A/1$
 $C \rightarrow 0/0A$

[2M]

- 3) Convert following CFG into CNF

$S \rightarrow AB/aB$
 $A \rightarrow aab/\epsilon$
 $B \rightarrow bbA/\epsilon$

[2M]

- 4) Construct Turing machine for Proper Substraction. [2M]

- 5) Construct LBA for the language

$L = \{a^n! \text{ Where } n \geq 0\}$

[1M]

- 6) Give the recursive definitions for

i) Addition

[1M]

QIV) Solve the following

- 1) Construct DFA accepting following languages over alphabet $\{0, 1\}$
- i) The set of all strings ending in "00" [2M]
- 2) Using Pumping Lemma show that following Languages are not regular
- i) $L = \{0^n 1^n / n \geq 1\}$ [2M]
- 3) Convert following CFG into GNF
- $S \rightarrow bB/abB$
 - $A \rightarrow aab$
 - $B \rightarrow bbA$ [2M]
- 4) A turing machine with several tapes is known as:
- a) Multi-tape turing machine
 - b) Poly-tape turing machine
 - c) Universal turing machine
 - d) All of the mentioned [1M]
- 5) Define context sensitive grammar with example. [2M]
- 6) Show that complement of recursive language is recursive only Diagram. [1M]

