

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
Hanuman Vyayam Prasarak Mandals's College of Engineering & Technology,
Amravati

BE Four year Semester IV (Computer Science & Engineering) Summer 2020 Exam

Subject: 4KS05 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**, [2M]

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 [1M]

b) If there exist regular grammar

c) If there exist context sensitive grammar

d) All of the above

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 $L = \{a^n b^{2n} / n \geq 1\}$ [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

[2M]

$S \rightarrow 0A/1B$

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

$C \rightarrow 0/0A$

3) Convert following CFG into CNF

[2M]

$S \rightarrow AB/aB$

$A \rightarrow aab/\epsilon$

$B \rightarrow bbA/\epsilon$

4) Construct Turing machine for Proper Substraction.

[2M]

5) Construct LBA for the language

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

[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]