



**University of Management & Technology, LAHORE CAMPUS SST, Department of  
Computing (CS)**

**Assignment# 2: TOA**

**Instructor: Rana Marwat Hussain**

Name # \_\_\_\_\_

STD ID# \_\_\_\_\_ **Total Marks: 20**

Note: (A) Attempt all Questions.

(B) Each question contains marks. Marks distribution explanation + formal working = total marks of one part. (C) Zero marks for plagiarism if found no tolerance policy as per the HEC & Department of CS UMT.

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**Q1. Convert the given Grammer to the reduced form:**

$S \rightarrow ASB \mid BSA \mid ASA \mid A \mid B \mid S$

$A \rightarrow aAS \mid a \mid \epsilon$

$B \rightarrow SbS \mid A \mid bb$

$C \rightarrow aa$

$D \rightarrow d$

**Q2. Convert the given Grammer to the CNF form:**

$S \rightarrow ASB \mid BSA \mid ASA \mid A \mid B \mid S$

$A \rightarrow aAS \mid a \mid \epsilon$

$B \rightarrow SbS \mid A \mid bb$

$C \rightarrow aa$

$D \rightarrow d$

**Q3. Convert the given Grammar to the CNF form:**

$$S \rightarrow a \mid XA \mid AX \mid b$$

$$S \rightarrow a \mid XA \mid AX \mid b$$

$$A \rightarrow RB$$

$$B \rightarrow AX \mid b \mid a$$

$$X \rightarrow a$$

$$R \rightarrow XB$$