ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
(Department of Computer Science)

WARNING

1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.**
2. **SUBMITTING ASSIGNMENTS BORROWED OR STOLEN FROM OTHER(S) AS ONE'S OWN WILL BE PENALIZED AS DEFINED IN "AIOU PLAGIARISM POLICY".**

Course: Theory of Automata (3452)

Level: Bachelor **Semester: Spring, 2013**
Total Marks: 100

ASSIGNMENT No. 1

Note: All questions carry equal marks.

Q.1 Discuss the most common set operation with the help of examples.

Q.2 What is recursive definition? Also describe the main purpose of recursive definition.

Q.3 What is string? Also describe concatenates, factor and flip operation with the help of examples.

Q.4 Define language. Elaborate the most common operation on languages.

Q.5 Prove that $L_1 - (L_2 \cup L_3) = (L_1 - L_2) \cap (L_1 - L_3)$

and $L_1 - (L_2 \cap L_3) = (L_1 - L_2) \cup (L_1 - L_3)$

ASSIGNMENT No. 2

Total Marks: 100

Note: All questions carry equal marks.

Q.1 What is the difference between regular language and regular expression?

Q.2 a) Explain the technique for generating string from CFG.
b) Explain the method used for converting a CFG to push down Automata.
c) Describe the properties of CFL.

Q.3 a) What is parsing? Explain its type with examples.
b) Define normal form in General context. Also explain back-us and Chomsky normal form.

Q.4 a) Define finite state machine. Explain various actions performed on FSM.
b) Differentiate between DFA and NFA with examples.
c) Discuss the pumping lemma for regular grammar.

Q.5 a) What is pushdown automata? Also describe pumping lemma for CFL.
b) What is difference between standard and universal Turing machine?

3452 Theory of Automata — Credit Hours: 3(3+0)

Recommended Book: Introduction to Computer Theory by Denial I. A. Cohen
Course Outline:

Unit No.1 Mathematical Preliminaries
Set theory, Relations and Functions, Recursive Definitions, Direct Graphs and Mathematics

Unit No.2 Languages
Strings and Languages, Finite Specification of Languages, Regular Sets and Expression

Unit No.3 Context-Free Grammars
Context-free Grammars and Languages, Regular Grammar and Arithmetic Expression

Unit No.4 Parsing
Leftmost Deviations and ambiguity, Regular Grammars, Bottom-up Parsing Shift Reducer Parser.

Unit No.5 Normal Forms
Elimination of Lambda Chain Rules, Chomaky Normal Form, Greibach Normal Form.

Unit No.6 Finite Automata
Finite State machine, Deterministic Finite Automata, Nondeterministic Finite Automata, Lambda Transitions, Expression Graphs

Unit No.7 Regular Languages
Regular Grammar and finite Automate, Non-regular
Language, Pumping Lemma for Regular Language, Closure Properties or Regular Language

Unit No.8 Pushdown Automata and Context-Free Languages
Pushdown Automata, Pushdown Automata and Context-free Language, pumping Lemma for Context-Free Languages.

Unit No.9 Turing Machine
Standard Turing Machine, Multiple Machines, Nondeterministic, Turing Machines.