

**Shambhunath Group of Institutions
Jhalwa, Allahabad**

COURSE: Compiler Design

GUIDE: PRASHANT SRIVASTAVA

COURSE: B.TECH. (COMPUTER SCIENCE)

ASSIGNMENT 1

Last Date of Submission: 19/02/2016

Question 1: What is bootstrapping? Explain with suitable example. How bootstrapping is done on more than one machine.

Question 2: Discuss the action taken by every phase of the compiler on the following string:

$$A=B*C+D/E$$

Question 3: Write CFG for the following languages:

- (i) $\{a^m b^n : m \geq n\}$
- (ii) $\{a^m b^n c^p d^q : m+n=p+q\}$

Question 4: Show the derivation steps and construct derivation tree for string aabbbb by using left most derivation with the grammar defined as

$$S \rightarrow AB | \wedge$$

$$A \rightarrow aB$$

$$B \rightarrow Sb$$

Question 5: Let G be the grammar $S \rightarrow 0B | 1A$, $A \rightarrow 0 | 0S | 1AA$, $B \rightarrow 1 | 1S | 0B$. For the string 00110101, find (a) left most derivation (b) right most derivation (c) derivation tree.

Question 6: Check whether the given grammar is ambiguous or not:

$$S \rightarrow iCtS$$

$$S \rightarrow iCtSeS$$

$$S \rightarrow a$$

$$C \rightarrow b$$

Question 7: A CFG G has the following productions:

$$S \rightarrow 0S0 | 1S1 | A$$

$$A \rightarrow 2B3$$

$$B \rightarrow 2B3 | 3$$

Describe the language generated by the parameters.

Question 8: Find CFG's that generate these regular languages over the alphabet $\Sigma=\{a,b\}$:

- (a) The set of all strings of odd length.
- (b) All the string without the substring aaa.
- (c) All strings with exactly one 'a' or exactly one 'b'

Question 9: The following grammar generates the languages of regular expression $0^*1^*(0+1)^*$:

$$S \rightarrow A|B$$

$$A \rightarrow 0A|^{\wedge}$$

$$B \rightarrow 0B|1B|^{\wedge}$$

Give the leftmost and rightmost derivations of the string 0010.

Question 10: Give the derivation tree for $((a+b)(c))+a+b$ using the following grammar:

$$E \rightarrow T$$

$$T \rightarrow F$$

$$F \rightarrow I$$

$$E \rightarrow E+T$$

$$T \rightarrow T*F$$

$$F \rightarrow (E)$$

$$I \rightarrow a|b|c$$