Note: Answer Five questions only.

Q.1 Define the following with simple example (choose five only):

(1) Ambiguity, (2) symbol table, (3) Lexeme
(4) Operator grammar, (5) handle, (6) Type checking

(10 marks)

Q.2 Consider the following context-free grammar:

\[
E' \rightarrow E \\
E \rightarrow E \ a \ T \ | \ T \\
T \rightarrow TF \ | \ F \\
F \rightarrow Fa \ b \ | \ c
\]

Parse the sentence \textit{cbcac} by using SLR method.

(10 marks)

Q.3 a) What is code optimization? There are a number of ways in which a compiler can improve a program without changing the function it computes. Briefly explain these ways with simple example for each type.

(6 marks)

b) Find the code optimization situations and their types:

\begin{verbatim}
begin
X=3, Y=7
Input ( p,q )
While ( p< q+5 ) do
begin
M= X/ p*q +2
N= p*q - 1
If Y>= 10 then
Print ( M,p)
Else
Print ( N,q)
End
End
\end{verbatim}

(4 marks)
Q.4 Consider the following grammar

\[ S \rightarrow WAB | A B C S \]
\[ A \rightarrow B | WB \]
\[ B \rightarrow \varepsilon | yB \]
\[ C \rightarrow z \]
\[ W \rightarrow x \]

a) Find first and follow
b) Is the grammar LL(1)? Justify your answer by using parsing table.
c) Briefly define LL (1) grammar.

(10 marks)

Q.5 a) Explain the four error routines in the bottom-up parsing table, and what is the suitable solution for each type.

(4 marks)

b) Consider the following grammar:

\[ S' \rightarrow S \]
\[ S \rightarrow aBc | bCc | aCd | bBd \]
\[ B \rightarrow \varepsilon \]
\[ C \rightarrow e \]

Find set of items (only) using Canonical method.

(6 marks)

Q.6 Consider the following grammar \( G \):

\[ S \rightarrow Sa | bL \]
\[ L \rightarrow ScL | Scd | a \]

(1) Remove left recursion from \( G \). The result is called \( G' \).
(2) Left factor \( G' \). The result is \( G'' \).
(3) Find the FIRST and FOLLOW sets for the non-terminals in grammar \( G'' \).

(10 marks)

Good Luck