Unit-3

Syntax Directed Definition (SDD)

- A SDD is a context Free Grammar together with Semantic Rules.
- Attributes are associated with grammar symbols and Semantic Rules are associated with productions.

SDD = CF Grammar + Semantic Rules.

- Attributes may be number, strings, data type, etc.

Production	Semantic Rules.
$E \to E+T$	$E.val = E.val + T.val$
$E \to T$	$E.val = T.val$
$T \to T*F$	$T.val = T.val * F.val$
$T \to F$	$T.val = F.val$
$F \to digit$	$f.val = digit.lval$

Types of Attributes :-

1. **Synthesized Attribute :-** The attributes which derive their values from their children nodes.

Example :-

$A \to BCD$

$A.S = B.S$

$A.S = C.S$

$A.S = D.S$

2. Inherited Attributes:- These are the attributes which derive their values from their Parent or Sibling nodes.

$A \rightarrow BCD$

$C.i = A.i$

$C.i = B.i$

$C.i = D.i$

Types of SDD

1. S-Attribute SDD

A SDD that uses only synthesized attributes is called as S-Attribute SDD.

$A \rightarrow BCD$

$A.S = B.S$

$A.S = C.S$

$A.S = D.S$

2. L-Attribute SDD

A SDD that uses both Synthesized and Inherited attributes is called as L-Attribute SDD but each inherited attribute is restricted to inherit from parent or left sibling only

Ex:- $A \rightarrow XYZ$

$Y.i = A.i$

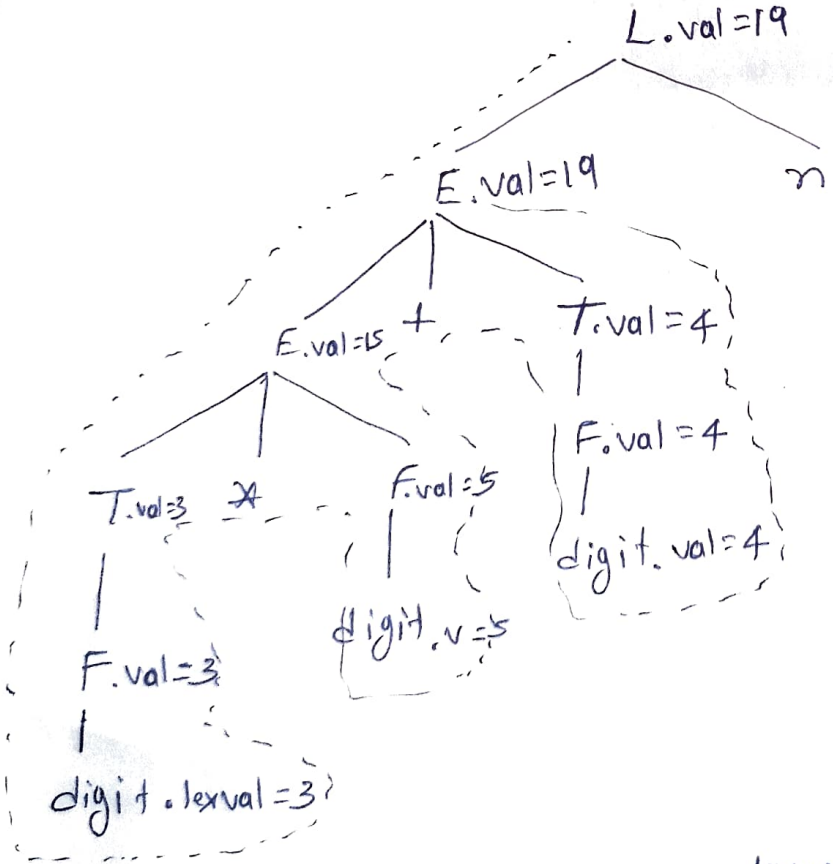
$Y.i = X.i$

$Y.i = Z.i$ ✗

Q) SDD of a Simple Desk Calculator

Annotated parse tree for 3 * 5 + 4 n

Production	Semantic Rules
L → E n	L.val = E.val
E → E + T	E.val = E.val + T.val
E → T	E.val = T.val
T → T * F	T.val = T.val * F.val
T → F	T.val = F.val
F → digit	F.val = digit.lexval



Q) Draw the annoted parse tree for 2 + 3 * 4

8) Dependency Graph

→ Dependency graph represents the flow of information among the attributes in the parse tree.

→ Dependency graphs are useful for determining the evaluation order for attributes in a parse tree.

Example:- Draw the Dependency graph for the expression 5+3*4

$E \to E+T$	$E.val = E.val + T.val$
$E \to T$	$E.val = T.val$
$T \to T*F$	$T.val = T.val * F.val$
$T \to F$	$T.val = F.val$
$F \to digit$	$F.val = digit.lexval$