Algorithm for construction of Predictive Parsing Table-

For each production $A \to \alpha$ of the grammar, do the following:-

Step-(i)- For each terminal 'a' in FIRST(α), add $A \to \alpha$ to M[A, a]

step-(ii)- if ϵ is in FIRST(α), then for each terminal (b) in FOLLOW(A), add $A \to \alpha$ to M[A, b]. If ϵ is in FIRST(α) and \$ in FOLLOW(A), add $A \to \alpha$ to M[A, \$] as well.

ex. consider the following grammar:

$E \to TE'$
$E' \to +TE' \mid \epsilon$
$T \to FT'$
$T' \to *FT' \mid \epsilon$
$F \to (E) \mid id$

construct predictive parsing table.

soln.

$E \to TE'$
$E' \to +TE' \mid \epsilon$
$T \to FT'$
$T' \to *FT' \mid \epsilon$
$F \to (E) \mid id$

FIRST(E) = {id, (}
FIRST(E') = {+, ϵ}
FIRST(T) = {id, (}
FIRST(T') = {*, ϵ}
FIRST(F) = {id, (}

FOLLOW(E) = {\$,)}
FOLLOW(E') = {\$,)}
FOLLOW(T) = {+, \$,)}
FOLLOW(T') = {+, \$,)}
FOLLOW(F) = {*, +, \$,)}

① $E \to TE'$
$A \to \alpha$
FIRST(α) = FIRST(TE') = FIRST(T) = {id, (}
Add: M[E, id] and M[E, (] to $E \to TE'$

② $E' \to +TE'$
FIRST(+TE') = {+}
Add M[E', +] to $E' \to +TE'$

③ $E' \to \epsilon$

FOLLOW(E') = {$,)}

add $E' \to \epsilon$ to M[E', $] and M[$E'$,)]

④ $T \to FT'$

FIRST(FT') = { id, (}

Add $T \to FT'$ to M[T, id] and M[T, (]

⑤ $T' \to *FT'$

FIRST($*FT'$) = {*}

Add $T' \to *FT'$ to M[T', *]

⑥ $T' \to \epsilon$

FOLLOW(T') = {+, $,)}

Add $T' \to \epsilon$ to M[T', +], M[T', $] and M[$T'$,)]

⑦ $F \to (E)$

FIRST((E)) = {(}

Add $F \to (E)$ to M[F, (]

⑧ $F \to id$

FIRST(id) = {id}

Add $F \to id$ to M[F, id]

	id	+	(	)	*	$
E	$E \to TE'$	Error	$E \to TE'$	Error	Error	Error
E'	Error	$E' \to +TE'$	Error	$E' \to \epsilon$	Error	$E' \to \epsilon$
T	$T \to FT'$	Error	$T \to FT'$	Error	Error	Error
T'	Error	$T' \to \epsilon$	Error	$T' \to \epsilon$	$T' \to FT'$	$T' \to \epsilon$
F	$F \to id$	Error	$F \to (E)$	Error	Error	Error

Predictive Parsing Table

Ex: Construct Predictive Parsing table for the following grammar:

$S \to aABb$ | FIRST(S) = {a} | FOLLOW(S) = {$}

$A \to c \mid \epsilon$ | FIRST(A) = {c, ε} | FOLLOW(A) = {d, b}

$B \to d \mid \epsilon$ | FIRST(D) = {d, ε} | FOLLOW(B) = {b}

	a	b	c	d	$
S	S→aABb				
A		A→ε	A→c	A→ε	
B		B→ε		B→d	

Predictive Parsing table

NOTE- Blank entries in the table are error entries.

① $S \to aABb$

FIRST(aABb) = {a}

Add $S \to aABb$ to M[S, a]

② $A \to c$

FIRST(c) = {c}

Add $A \to c$ to M[A, c]

③ $A \to \epsilon$

FOLLOW(A) = {d, b}

Add $A \to \epsilon$ to M[A, d] and M[A, b]

④ $B \to d$

FIRST(d) = {d}

Add $B \to d$ to M[B, d]

⑤ $B \to \epsilon$

FOLLOW(B) = {b}

Add $B \to \epsilon$ to M[B, b].