Branch : CSE & IT Batch : Hinglish

WEEKLY TEST – 02

Subject : Compiler Design

Topic : Lexical Analysis & Syntax Analysis

Maximum Marks 15

Q.1 to 5 Carry ONE Mark Each

[NAT]

1. Consider G be a grammar with the following productions:

$A \rightarrow A + B \mid B$

$B \rightarrow B * C \mid C$

$C \rightarrow (A)$

$C \rightarrow id$

Let, X is set of lookaheads in $A \rightarrow .$ B and Y is set of lookaheads in $C \rightarrow .id$. Then how many numbers of items are present in $X \cap Y$ if LR (1) parser is used?

[MSQ]

2. Which of the following statement is/are correct?

(a) LALR parser is more powerful the SLR parser.

(b) SLR parser is more powerful the CLR parser.

(c) LR (0) is the least powerful parser.

(d) CLR is powerful that LALR and LR(0) parser.

[MSQ]

3. Which of the following is/are incorrect.

(a) Every regular grammar is LL(1).

(b) If given grammar G is LL(1) then it is LR(0).

(c) Let SLR(1) has x_1 states and CLR(1) has x_2 states then the relation between x_1 and x_2 is $x_1 < x_2$.

(d) Recursive descent parser is a top - down parser.

[MCQ]

4. Consider the given grammar

$X \rightarrow a \mid ab \mid abc$

The given grammar is_____.

(a) LL(1) (b) LL(2)

(c) LL(3) (d) None of these

[NAT]

5. Consider the following grammar.

$S' \rightarrow S$

$S' \rightarrow S*A \mid A$

$A \rightarrow A+B \mid B$

$B \rightarrow B- C \mid C$

$C \rightarrow (S) \mid id$

If I_0 is the set of LR(0) items $\{[S' \rightarrow S\cdot] [S \rightarrow S\cdot *A]\}$, then goto (closure ($I_0$, *) contains exactly___items.

Q.6 to 10 Carry TWO Mark Each

[NAT]

6. Consider the given grammar.

$S \rightarrow A$

$A \rightarrow ABC \mid BC$

$B \rightarrow Cc \mid b \mid \in$

$C \rightarrow \in$

How many number of unique production are in goto $(A \rightarrow A \cdot BC) \cup$ goto $(A \rightarrow \cdot BC)$

[MCQ]

7. Consider the following grammars.

G_1: $S \rightarrow aSbS \mid bSaS \mid \in$

G_2: $S \rightarrow aABa$

$A \rightarrow c \mid \in$

$B \rightarrow d \mid \in$

Which of the following is correct?

(a) Only G_1 is LL(1).
(b) Only G_2 is LL(1).
(c) Both G_1 and G_2 are LL(1).
(d) Neither of G_1 and G_2 are LL(1).

[MCQ]

8. Consider the following grammar.

$S \rightarrow (A \mid B] \mid B)$

$A \rightarrow B) \mid B]$

$B \rightarrow \in$

Which of the following is correct statement if CLR(1) parser is used ?

(a) The given grammar has RR conflict but no SR conflicts.
(b) The given grammar has RR conflict but no RR conflicts.
(c) The given grammar has RR and SR conflicts.
(d) The given grammar do not have RR and SR conflicts.

[MSQ]

9. Which of the following statement is/are correct about given language?

$L = \{a^l b^m c^n \mid l = m \text{ or } m = n, l, m, n > 0\}$

(a) The language is not LR(0).
(b) The language is ambiguous.
(c) The language is not LR(k) for any k.
(d) The language recognizes by DPDA (Deterministic Pushdown Automata.)

[MCQ]

10. Consider the given grammar.

$S \rightarrow AaB \mid aA$

$A \rightarrow bB \mid B$

$B \rightarrow aB \mid a$

If S, A, B are non-terminals and a, b are terminals.

The above grammar is?

(a) LALR(1) but not SLR(1)
(b) CLR(1) but not LALR(1)
(c) CLR(1) and LALR(1)
(d) Neither CLR (1) nor LALR(1)

Answer Key

1.	**(3)**	**5.**	**(7)**	**9.**	**(a,b,c)**
2.	**(a,c,d)**	**6.**	**(4)**	**10.**	**(d)**
3.	**(a,b,c)**	**7.**	**(b)**		
4.	**(c)**	**8.**	**(d)**		

Hints and Solutions

1. (3)

A' $\rightarrow$ .A, {$}

A $\rightarrow$ ·A + B {$, +}

A $\rightarrow$ ·B{$, +} …….$\rightarrow$[A$\rightarrow$ ·B]

B $\rightarrow$ ·B*C, {$, *}

B $\rightarrow$ ·C, {$, *}

C $\rightarrow$ ·(A), {$, *}

C $\rightarrow$ ·id, {$, *}$\rightarrow$[C$\rightarrow$ id]

From A'$\rightarrow$ A, {$} and A$\rightarrow$ ·A+B, A's production will have look aheads as {$, +}

From A$\rightarrow$·B, {$,+} and B$\rightarrow$ B*C, B's procution will have look ahead as {$, +,*}.

B $\rightarrow$ ·C, {$, *,+} C's production will have lookahed as {$,+,*}

So, total 3 different lookahead are there.

2. (a, c, d)

CLR > LALR > SLR > LR(0)

So, CLR is the most powerful parser and LR(0) is the least powerful parser.

LALR is more powerful then SLF parser. (True)

SLR is more powerful then CLF parser. (False)

LR(0) is the least powerful parser. (True)

CLR is powerful than LALR and LR(0) parser. (True)

3. (a,b,c)

Every regular grammar is LL(1), this statement is incorrect regular grammar can be ambigrous and ambigous grammar cannot be LL(1).

If a grammar is LL(1) then it must be CLR(1) but it may or many not be LR(0). Hence given statement is incorrect.

If SLR(1) has x_1 states and CLR(1) has x_2 states then the relation between x_1 and x_2 is $x_1 \leq x_2$. So incorrect.

Recursive descent parser is a top down parser. Correct.

So, option (a,b,c) are answer.

4. (c)

Given grammar

$x \rightarrow$ a | ab | abc

For LL(1)

First (a) $\cap$ First (ab) = a {this is not empty}

So, the grammar is not LL(1).

For LL(2).

Second (ab) $\cap$ second (abc) = {this is not empty}

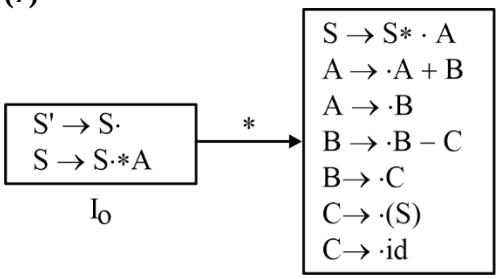
So, the grammar is not LL(2).

For LL(3).

Third (ab) $\cap$ Third (abc) = {empty}

So, the given grammar is LL(3).

5. (7)



So, goto (closure (I_o),*) contains exactly 7 States.

6. (4)

Augumented grammar is as follows:

S' $\rightarrow$ S

S $\rightarrow$ ·A

A $\rightarrow$ ·ABC

A$\rightarrow$ ·BC

B $\rightarrow$ ·Cc

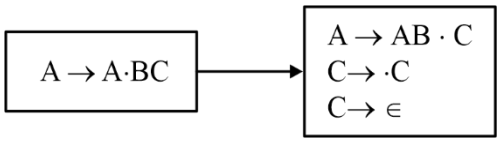
B $\rightarrow$ ·b

B $\rightarrow \in$

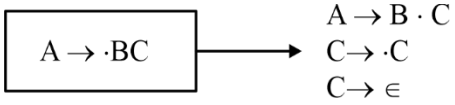
C $\rightarrow$ ·C

C $\rightarrow \in$

For, A $\rightarrow$ A·BC



For, A → ·BC



Goto (A→A· BC) ∪ goto (A→· BC)

{A→AB.C, C→·C, C→∈}∪{A→B·C, C→ ·C, C→∈}

{A→AB·C, A→B·C, C→·C, C→∈}

Total 4 production.

7. (b)

G_1:

Frist (S) = {a,b,∈}

Follow (S) = {a,b,$}

	a	B	$
S	S→aSbS S→∈	S→bSaS S→∈	S→∈

This is not LL(1).

G_2:

Frist (S) = {a}

Frist (A) = {c,∈}

Frist (B) = {d,∈}

Follow (S) = {$}

Follow (A) = {d,b}

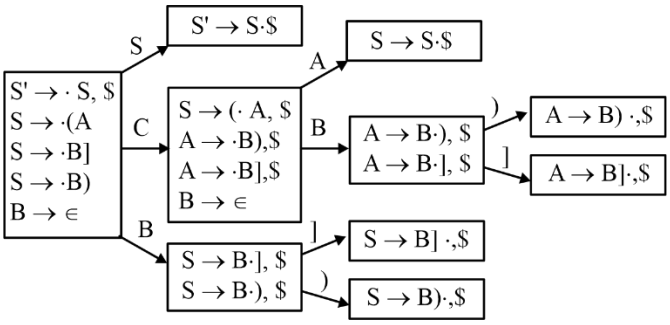
Follow (B) = {b}

	a	b	c	d	$
S	S→aABb				
A		A→∈	A→C	A→∈	
B		B→∈		B→d	

This is LL(1).

So, option (b) is corret.

8. (d)



The given garmmar do not have any RR conflict and SR conflict. Therefore, option (d) is correct.

9. (a,b,c)

L ={$a^l b^m c^n$| l = m or m = n } generates non-determinstic context free language.

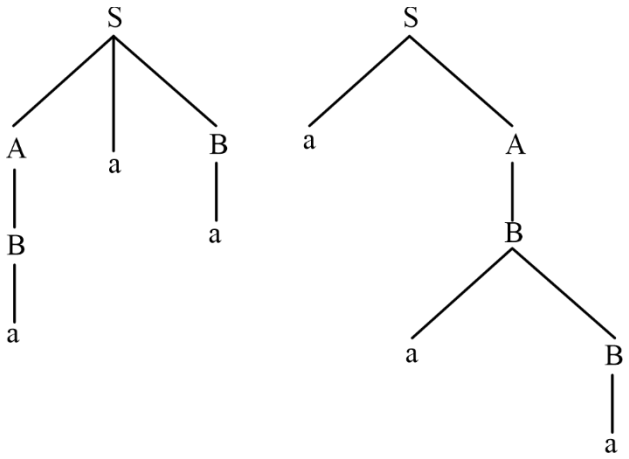
So, it cannot abe recongnized using DPDA.

The grammar can generate ambiguous grammar. So when grammar can be ambigous it cannot generate LL(k) or LR(k) grammar.

Therefore, option (a,b,c) are correct.

10. (d)

The given grammar is ambiguous grammar. For string aaa, we have multiple parse tree.



So, the grammar is not SLR(1), not CLR(1), and also not LALR(1).

Hence, Option (d) is correct.