(a) Equal number of a's and b's.
(b) Number of a's or number of b's in given string
(c) Number of a's and b's in a given string
(d) None

04. Consider the following Syntax Direct Translation scheme

E → E + T { E.value = '+' || E.value || T.value}
E → E – T { E.value = '–' || E.value || T.value}
E → T { E.value = T.value}
T → id {T.value = id}
(Assume || is string concatenation)

The above SDTS specifies _____.
(a) Expression Evaluation
(b) Infix to Postfix conversion

07. Consider the following grammar and associated semantic actions.

G → F	{G.p = F.p}
F → F1 ∧ F2	{ F.p = And(F1.p, F2.p)}
F → F1 ∨ F2	{F.p = Or(F1.p, F2.p)}
F → ¬ F1	{ F.p = Neg(F1.p)}
F → F1 ⇒ F2	{F.p = Or(Not(F1.p), F2.p)}
F → (F1)	{F.p = F1.p}
F → id	{ F.p = id.lexeme}

Give the value of the attributes of G after parsing ¬(A ∧(A ⇒B)).

(a) Neg(And(A,Or(Not(B),A))).
(b) Neg(And(A,Or((A),notB))).
(c) Neg(And(A,Or(Not(A),B))).
(d) Neg(And(A,Or((A),B))).

Q.47 Consider the following grammar and the semantic actions to support the inherited type declaration attributes. Let X_1, X_2, X_3, X_4, X_5 and X_6 be the place holders for the non-terminals D, T, L or L_1 in the following table:

Productions rule	Semantic action
D → TL	L.type = T.type
T → int	T.type = int
T → float	T.type = float
$L \rightarrow L_1$, id	X_3.type = X_4.type addType(identry, X_5.type)
L → id	addType(identry, X_6.type)

Which one of the following are the appropriate choices for X_1, X_2, X_3 and X_4?

(a) $X_1 = L, X_2 = T, X_3 = L_1, X_4 = L$
(b) $X_1 = L, X_2 = L, X_3 = L_1, X_4 = T$
(c) $X_1 = T, X_2 = L, X_3 = L_1, X_4 = T$
(d) $X_1 = T, X_2 = L, X_3 = T, X_4 = L_1$

Gate-17 (2 marks)
Ullman 2nd edition pg. 315
input:- T int (L) A, B
D
T.type → L.type
int
L , B
A
'type' is inherited

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Q.47 Consider the following grammar and the semantic actions to support the inherited type declaration attributes. Let X_1, X_2, X_3, X_4, X_5 and X_6 be the place holders for the non-terminals D, T, L or L_1 in the following table:

Productions rule	Semantic action
$D \rightarrow TL$	X_2.type = X_3.type
$T \rightarrow$ int	T.type = int
$T \rightarrow$ float	T.type = float
$L \rightarrow L_1$, id	X_3.type = X_4.type addType(identry, X_5.type)
$L \rightarrow$ id	addType(identry, X_6.type)

Which one of the following are the appropriate choices for X_1, X_2, X_3 and X_4?

(a) $X_1 = L, X_2 = T, X_3 = L_1, X_4 = L$ (b) $X_1 = L, X_2 = L, X_3 = L_1, X_4 = T$

(c) $X_1 = T, X_2 = L, X_3 = L_1, X_4 = T$ (d) $X_1 = T, X_2 = L, X_3 = T, X_4 = L_1$

Gate-17 (2 marks)

Ullman 2nd edition page 315

input:- int A, B

D

int = T.type — L.type

int — L_1.type — B

A

'type' is inherited

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(b) Syntax Analysis

(c) Semantic Analysis

(d) Intermediate code generation

02. The following SDT is

$E \rightarrow E_1 + T$ {E. val = E_1. val + T. val}

$E \rightarrow T$ {E. val = T. val}

$T \rightarrow$ id {T. val = id}

E.val — E_1.val + T.Val

'Val' is synthesized

(a) S- attributed (b) L- attributed

(c) Both (a) and (b) (d) None

'S' attribute 'L' attribute

input: abab

03. The following SDT checks

$S \rightarrow aSb$ {S. count = S. count + 2}

$S \rightarrow bSa$ {S. count = S. count + 2}

$S \rightarrow \varepsilon$ {S. count = 0}

(a) Equal number of a's and b's.

string

$S \rightarrow a$ {S. t = 2}

$S \rightarrow b$ {S. t = 6}

If the Top down parser carries out the translations for an input string "babcc", output is _____.

(a) 0 (b) 6

(c) 10 (d) 5

S = 10

06. Consider the SDT given below.

$S \rightarrow S_1 S_2 c$ {S.val = S_1. val * S_2 .val – 4}

$S \rightarrow a$ {S.val = 6}

$S \rightarrow b$ {S. val = 2}

If the SDT gives the input string abc, then the output is

(a) 5 (b) 8

(c) 0 (d) 2

S = 6 × 2 − 4 = 8

07. Consider the following grammar and

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Q.39 Consider the productions A → PQ and A → XY. Each of the five non-terminals A, P, Q, X and Y has two attributes: *s* is a synthesized attribute, and *i* is an inherited attribute. Consider the following rules.

Gate-2020 (2-marks)

Rule 1: P.*i* = A.*i* + 2, Q.*i* = P.*i* + A.*i* and A.*s* = P.*s* + Q.*s*

Rule 2: X.*i* = A.*i* + Y.*s* and Y.*i* = X.*s* + A.*i*

Which one of the following is TRUE?

(a) Neither Rule 1 nor Rule 2 is L-attributed.

(b) Both Rule 1 and Rule 2 are L-attributed.

(c) Only Rule 1 is L-attributed.

(d) Only Rule 2 is L-attributed.

Rule 1 : A → P Q. P.i = A.i + 2 (A.i → P.i). Q.i = P.i + A.i (A.i → P.i → Q.i, left). A.s = P.s + Q.s (A.s ← P.s, Q.s)

's' is synthesized, 'i' is inherited — 'L' attributed

Rule 2 : A → X Y. X.i = A.i + Y.s (A.i → X.i ← Y.s, right). Y.i = X.s + A.i (A.i → X.s → Y.i)

'i' is Inherited — not 'L' attributed

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58. Consider the translation scheme shown below.

Gate-2003 (2-marks)

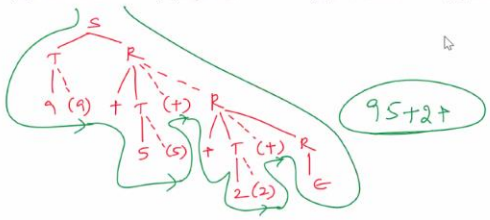
S → T R

R → + T {*print*('+');} R|ε

T → **num** {*print*(**num**.val);}

Here **num** is a token that represents an integer and **num**.val represents the corresponding integer value. For an input string '9 + 5 + 2', this translation scheme will print

(A) 9 + 5 + 2 (B) 9 5 + 2 + (C) 9 5 2 + + (D) + + 9 5 2



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46. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a, b}. (Gate-2017) 2-marks

S → aA {print 1}
S → a {print 2}
A → Sb {print 3}

Using the above SDTS, the output printed by a bottom-up parser, for the input aab is:

(A) 1 3 2 (B) 2 2 3 (C) 2 3 1 (D) syntax error

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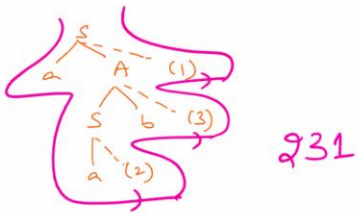
46. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a, b}. (Gate-2017) 2-marks

S → aA {print 1}
S → a {print 2}
A → Sb {print 3}

Using the above SDTS, the output printed by a bottom-up parser, for the input aab is:

(A) 1 3 2 (B) 2 2 3 (C) 2 3 1 (D) syntax error



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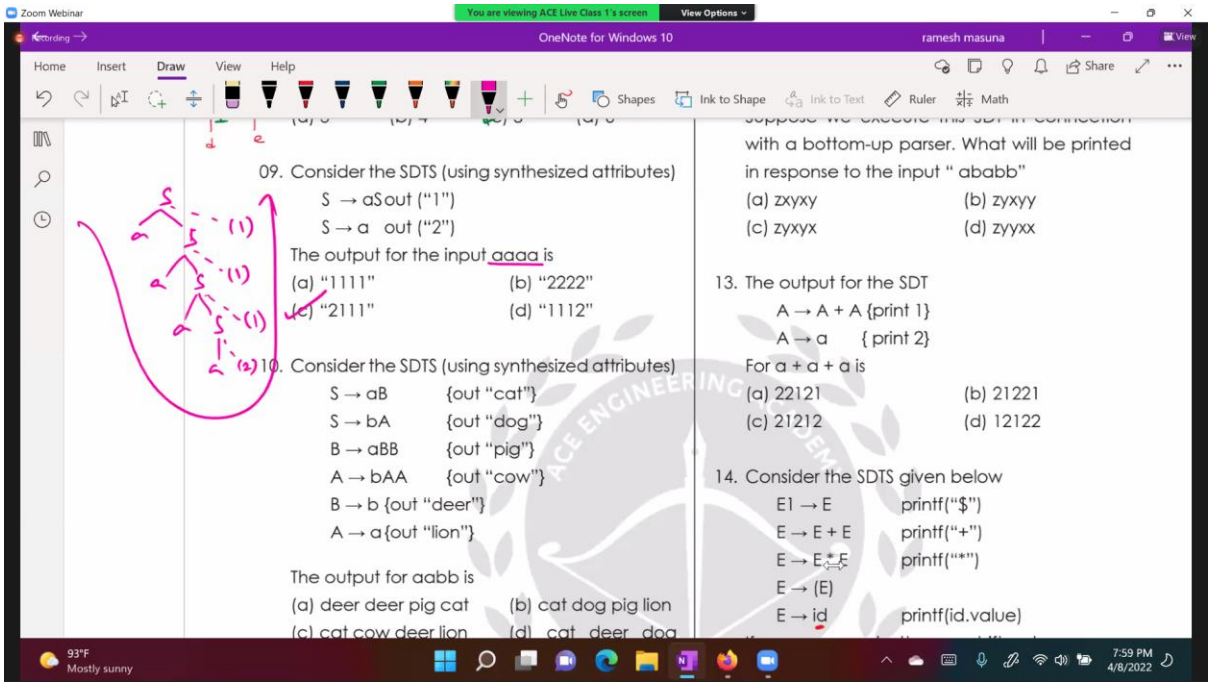
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09. Consider the SDTS (using synthesized attributes)
S → aS out ("1")
S → a out ("2")
The output for the input aaaa is
(a) "1111" (b) "2222"
(c) "2111" (d) "1112"
10. Consider the SDTS (using synthesized attributes)
S → aB {out "cat"}
S → bA {out "dog"}
B → aBB {out "pig"}
A → bAA {out "cow"}
B → b {out "deer"}
A → a {out "lion"}
The output for aabb is
(a) deer deer pig cat (b) cat dog pig lion
with a bottom-up parser. What will be printed
in response to the input " ababb"
(a) zxyxy (b) zyxyy
(c) zyxyx (d) zyyxx
13. The output for the SDT
A → A + A {print 1}
A → a { print 2}
For a + a + a is
(a) 22121 (b) 21221
(c) 21212 (d) 12122
14. Consider the SDTS given below
E1 → E printf("$")
E → E + E printf("+")
E → E * E printf("*")
E → (E)
E → id printf(id.value)
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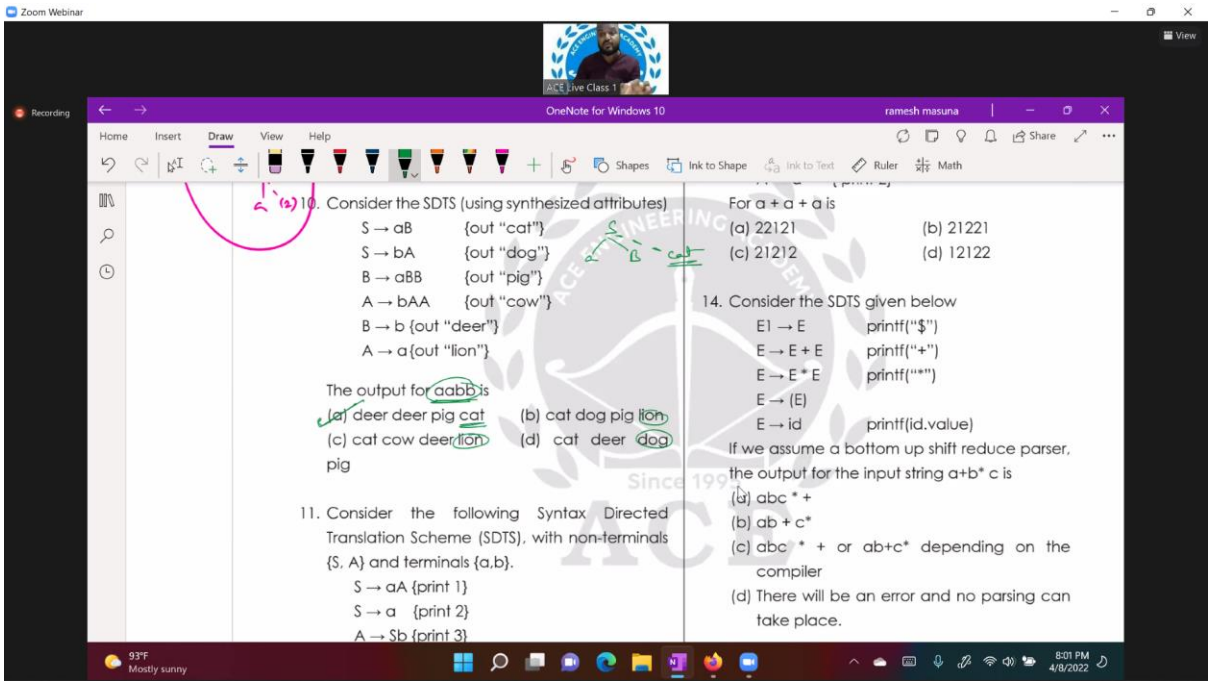
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S → aB {out "cat"}
S → bA {out "dog"}
B → aBB {out "pig"}
A → bAA {out "cow"}
B → b {out "deer"}
A → a {out "lion"}
The output for aabb is
(a) deer deer pig cat
(c) cat cow deer lion
pig
(b) cat dog pig lion
(d) cat deer dog
11. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a,b}.
S → aA {print 1}
S → a {print 2}
A → Sb {print 3}
For a + a + a is
(a) 22121 (b) 21221
(c) 21212 (d) 12122
14. Consider the SDTS given below
E1 → E printf("$")
E → E + E printf("+")
E → E * E printf("*")
E → (E)
E → id printf(id.value)
If we assume a bottom up shift reduce parser, the output for the input string a+b* c is
(a) abc * +
(b) ab + c*
(c) abc * + or ab+c* depending on the compiler
(d) There will be an error and no parsing can take place.
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11. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a,b}.

S → aA {print 1}
S → a {print 2}
A → Sb {print 3}

Using the above SDTS, the output printed by a bottom-up parser, for the input **aab** is:

(a) 1 3 2 (b) 2 2 3
(c) 2 3 1 (d) syntax error

(a) abc * +
(b) ab + c*
(c) abc * + or ab+c* depending on the compiler
(d) There will be an error and no parsing can take place.

15. Consider the following translation scheme

S → AB
B → * A {print *} B / ε
A → C + A {print +} / C
C → S / id {print id}

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08. Consider the SDTS (using synthesized attributes)

$E_1 \rightarrow E_2 * E_3$ [E_1.sem = E_2.sem × E_3.sem]
$E_4 \rightarrow E_5 + E_6$ [E_4.sem = E_5.sem + E_6.sem]
E → id [E..sem = 1]

The output for the input a+b+c+d+e is
(a) 3 (b) 4 (c) 5 (d) 6

09. Consider the SDTS (using synthesized attributes)

S → aSout ("1")
S → a out ("2")

The output for the input aaaa is
(a) "1111" (b) "2222"
(c) "2111" (d) "1112"

10. Consider the SDTS (using synthesized attributes)

S → aB {out "cat"}
S → bA {out "dog"}

12. Here is a postfix SDT:

S → aS {print "x"}
S → bS {print "y"}
S → a {print "z"}
S → b {print "z"}

Suppose we execute this SDT in connection with a bottom-up parser. What will be printed in response to the input " ababb"
(a) zxyxy (b) zyxyy
(c) zyxyx (d) zyyxx

13. The output for the SDT

A → A + A {print 1}
A → a { print 2}

For a + a + a is
(a) 22121 (b) 21221
(c) 21212 (d) 12122

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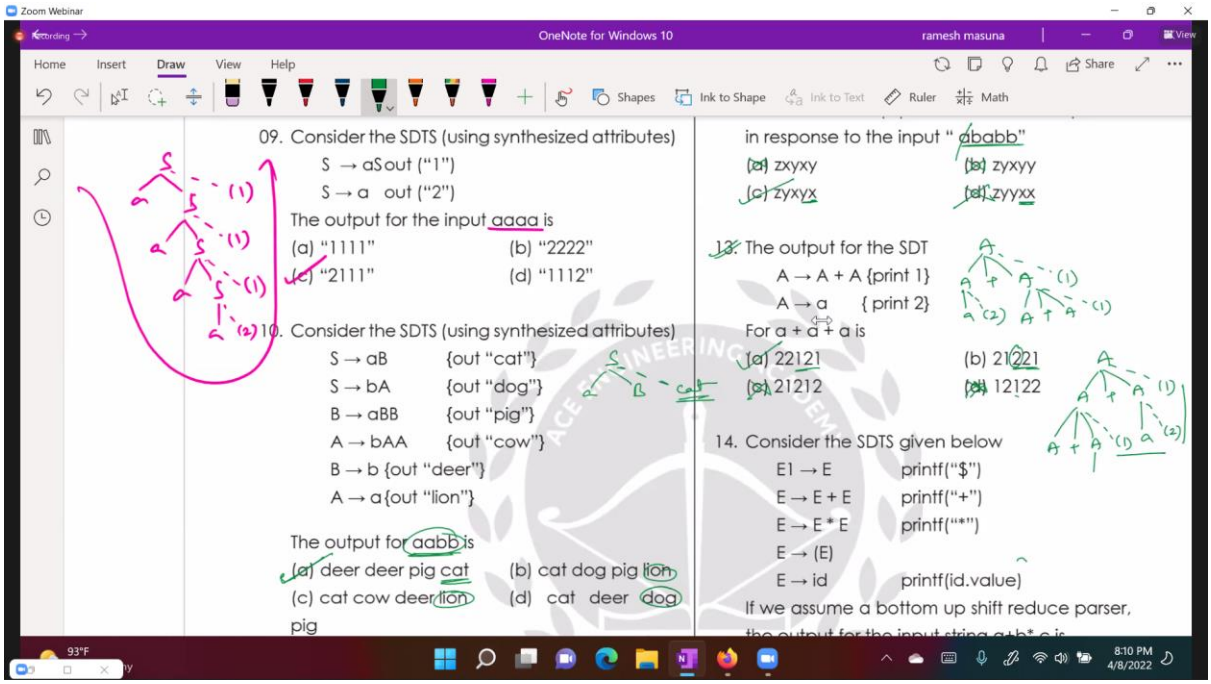
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09. Consider the SDTS (using synthesized attributes)
S → aSout ("1")
S → a out ("2")
The output for the input aaaa is
(a) "1111" (b) "2222"
(c) "2111" (d) "1112"
10. Consider the SDTS (using synthesized attributes)
S → aB {out "cat"}
S → bA {out "dog"}
B → aBB {out "pig"}
A → bAA {out "cow"}
B → b {out "deer"}
A → a{out "lion"}
The output for aabb is
(a) deer deer pig cat (b) cat dog pig lion
(c) cat cow deer lion (d) cat deer dog
pig
in response to the input " abaabb"
(a) zxyxy (b) zyxyy
(c) zyxyx (d) zyyxx
13. The output for the SDT
A → A + A {print 1}
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For a + a + a is
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E1 → E printf("$")
E → E + E printf("+")
E → E * E printf("*")
E → (E)
E → id printf(id.value)
If we assume a bottom up shift reduce parser,
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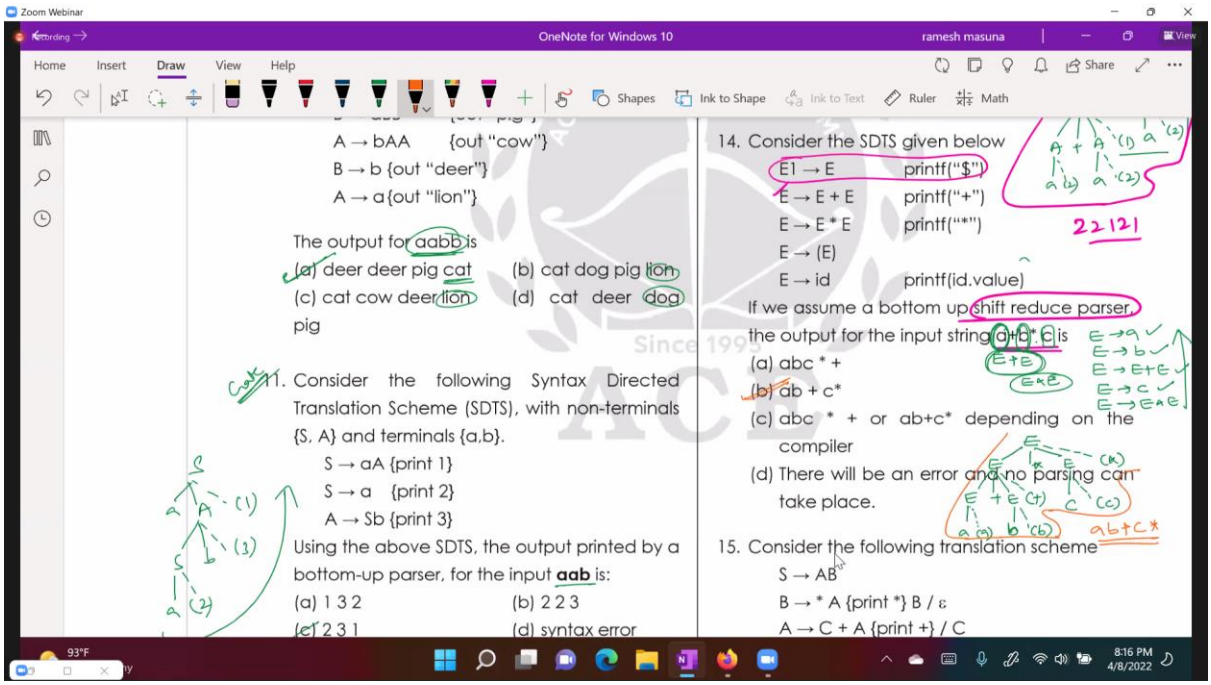
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A → bAA {out "cow"}
B → b {out "deer"}
A → a{out "lion"}
The output for aabb is
(a) deer deer pig cat (b) cat dog pig lion
(c) cat cow deer lion (d) cat deer dog
pig
11. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a,b}.
S → aA {print 1}
S → a {print 2}
A → Sb {print 3}
Using the above SDTS, the output printed by a bottom-up parser, for the input aab is:
(a) 1 3 2 (b) 2 2 3
(c) 2 3 1 (d) syntax error
14. Consider the SDTS given below
E1 → E printf("$")
E → E + E printf("+")
E → E * E printf("*")
E → (E)
E → id printf(id.value)
If we assume a bottom up shift reduce parser,
the output for the input string a+b* c is
(a) abc * +
(b) ab + c*
(c) abc * + or ab+c* depending on the compiler
(d) There will be an error and no parsing can take place.
15. Consider the following translation scheme
S → AB
B → * A {print *} B / ε
A → C + A {print +} / C
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16. Consider the SDT given below

E → E ↑ E {print ↑}
E → E * E {print *}
E → id {print id}

If the shift reduce parser constructs a parse tree for the input sentence a * b ↑ c the above translation prints.

(a) a b * c ↑
(b) a b c ↑
(c) Both
(d) None

Key for Practice Questions

01. (c) 02. (c) 03. (c) 04. (c) 05. (c)

06. (b) 07. (c) 08. (c) 09. (c) 10. (a)

11. (c) 12. (c) 13. (a) 14. (c) 15. (d)

(a) Make parsing and semantic analysis simpler
(b) Improve error recovery and error reporting
(c) Increase the chances of reusing the machine independent code optimizes in other compilers
(d) Improve the register allocation

02. The following are **not** standard intermediate forms of the source program
(a) Quadruples
(b) Triples
(c) Postfix
(d) Machine language code

03. Which of the following is **not** a Three Address Code(TAC)
(a) return 0 (b) if a > b goto c

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