Task 1 - Metalanguages

EBNF

Component	Symbol	Meaning	Example
Production rule	=	'Is defined as'	Digit **=** 0 | 1 | 2 | 3 | 4 | 5
Non-terminal symbol			
Terminal symbol			
Alternatives			
Optional			
Repetition			

Railroad Diagrams

Component	Symbol / Example
Non-terminal symbol	
Terminal symbol	
Alternatives	
Optional	
Repetition	

Question 1:

Consider the following EBNF definition of a mussum string.

mussum = <digit> | <letter> | <letter><mussum><letter> | <digit><mussum><digit>

<digit> = 1 | 2 | 3
<letter> = m | u | s

Which of the following is a legal mussum string?

(A) m1

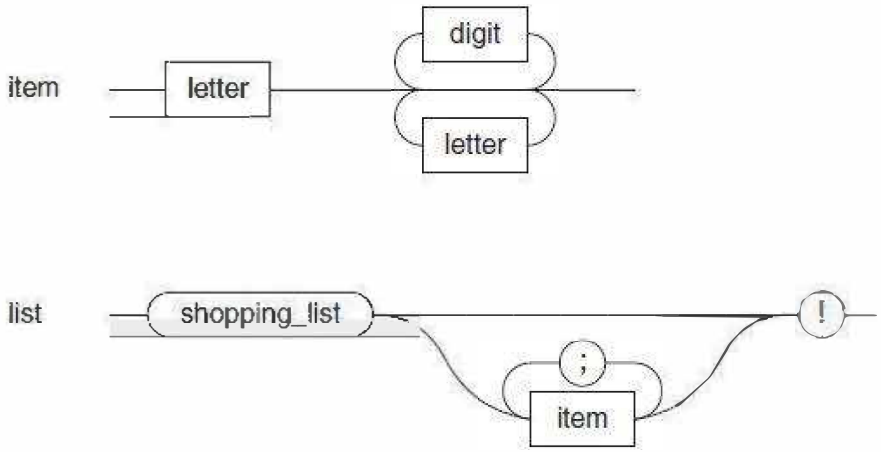
(B) muum

(C) mu1sm

(D) mussum

Question 2:

Consider the following railroad diagram. **3**



Express the syntax described in the railroad diagram in Extended Backus–Naur Form (EBNF).

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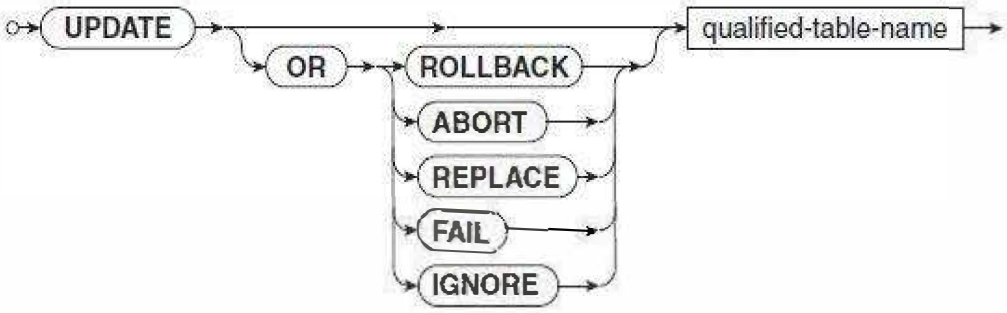
Question 3:

Part of the syntax of a programming language is represented in the documentation shown.

update-stmt:



What type of representation is this?

(A) BNF diagram

(B) Database schema

(C) IPO chart

(D) Railroad diagram

Question 4:

EBNF syntax definitions for a language are given below.

char = A|B|C
digit = 1|2|3
op = +|–
operand = <char>{<char>}<digit>
statement = <op><operand><operand>{<op><operand>}

Which of these is a legal statement in this language?

(A) +ABC

(B) –A2BC3

(C) +A1BC23–AB

(D) +BC32A1–A2

Question 5:

Consider the EBNF description of a computer language.

<digit> = 1|2
<letter> = a|b|c
<expression> = {<letter>} <digit> [{<digit>}]

Which of the following would be an allowable expression in this language?

(A) 2
(B) b
(C) bc
(D) a321

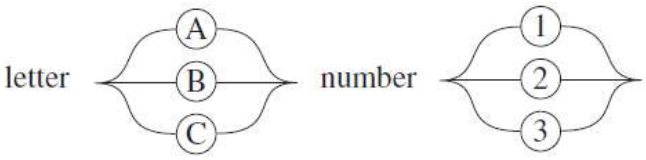
Question 6:

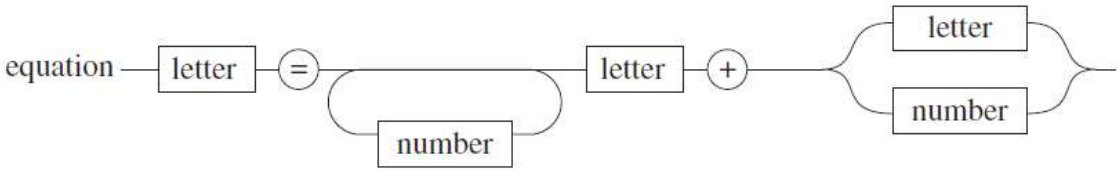
Which of the following is an example of a metalanguage?

(A) ASCII
(B) Data dictionary
(C) EBNF
(D) Pseudocode

Question 7:

Consider the railroad diagrams drawn below:





Which of the following is a valid equation?

(A) C = B + A
(B) B = 2 1 + C
(C) B = 2 B B + C
(D) A = 1 B + C + 2 A

Question 8:

The syntax and structure of a simplified programming language are described below.

Syntax

Letter = (A…Z)|(a…z)
Digit = (0…9)
Condition = (= | < >)
Variable = <Letter>{<Letter>}
Constant = <Digit>{<Digit>}
Condition Exp = <Variable><Condition>(<Variable>|<Constant>)
Variable List = <Variable>{,<Variable>}

Structure

Assignment Statement = <Variable> : = <Constant>
User Input Statement = GET <Variable List>
Conditional Statement = IFF <Conditional Exp> THEN
(<Assignment Statement>|<User Input Statement>) ENDIFF

(i) Why is the following statement legal? **1**

GET name,number,age

(ii) Discuss the legality of the structure and syntax of the following statement. **2**

IF number : = 7 THEN name : = Tom ENDIF

(iii) Use a railroad diagram to define a post-test repetition structure for this language. **3**

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i)

ii)

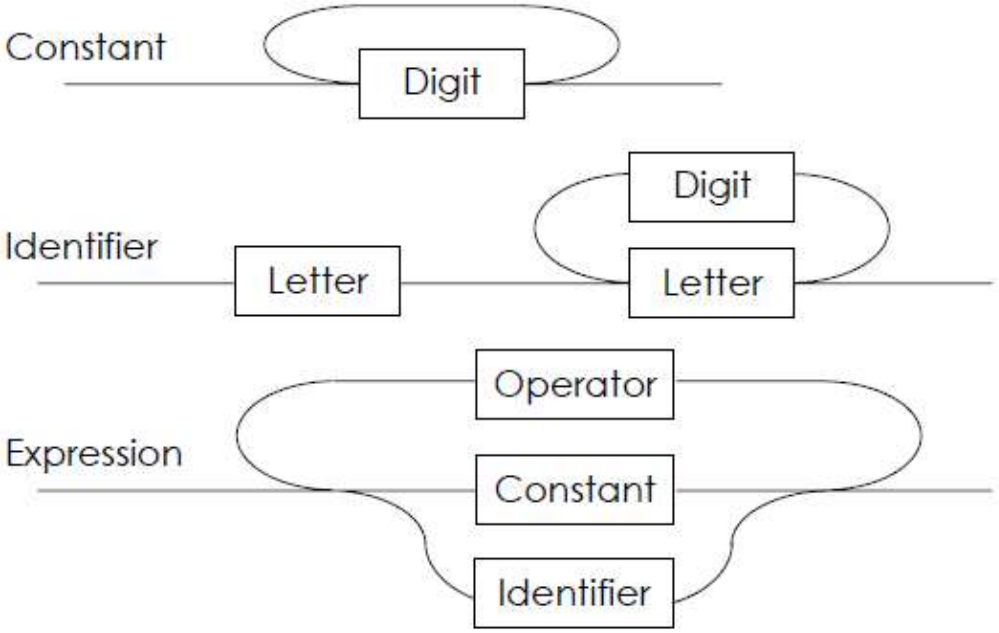
iii)

Question 9:

Digit = 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

Letter = a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z

Operator = < | > | + | - | * | /



A) Construct EBNF definitions equivalent to the *Constant, Identifier and Expression* railroad diagrams above.

B) Construct a railroad diagram for an *Operator* as shown in EBNF above.

C) `cd = ab * cd` is a valid *Expression*. Write down two more valid *Expressions*.