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Assignment- Lexical Analysis

Q1. The number of tokens in the following C statement is

printf("i=%d, &i=%x", i, &i);

A. 3
B. 26
C. 10
D. 21

Q2. Which data structure in a compiler is used for managing information about variables and their attributes?

A. Abstract syntax tree
B. Symbol table
C. Semantic stack
D. Parse table

Q3. Relative to the program translated by a compiler, the same program when interpreted runs

A) Faster
B) Slower
C) At the same speed
D) May be faster or slower

Q4 The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?

(A) Finite state automata

(B) Deterministic pushdown automata

(C) Non-deterministic pushdown automata

(D) Turing machine

Q5. In a compiler the module the checks every character of the source text is called:

A. The code generator.
B. The code optimiser.
C. The lexical analyser.
D. The syntax analyser.

Q6. Match the following according to input(from the left column) to the compiler phase(in the r right column) that process it:

(P) Syntax tree	(i) Code generator
(Q) Character stream	(ii) Syntax analyzer
(R) Intermediate representation	(iii) Semantic analyzer
(S) Token stream	(iv) Lexical analyzer

(A) P -> (ii), Q -> (iii), R -> (iv), S -> (i)
(B) P -> (ii), Q -> (i), R -> (iii), S -> (iv)
(C) P -> (iii), Q -> (iv), R -> (i), S -> (ii)
(D) P -> (i), Q -> (iv), R -> (ii), S -> (iii)

Q7 Match the following:

P. Lexical analysis	1. Graph coloring
Q. Parsing	2. DFA minimization
R. Register allocation	3. Post-order traversal
S. Expression evaluation	4. Production tree

A. P-2, Q-3, R-1, S-4

B. P-2, Q-1, R-4, S-3

C. P-2, Q-4, R-1, S-3

D. P-2, Q-3, R-4, S-1

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Q8. Which one of the following grammars is free from left recursion?

(A)
$$\begin{aligned} S &\rightarrow AB \\ A &\rightarrow Aa \mid b \\ B &\rightarrow c \end{aligned}$$

(B)
$$\begin{aligned} S &\rightarrow Ab \mid Bb \mid c \\ A &\rightarrow Bd \mid \varepsilon \\ B &\rightarrow e \end{aligned}$$

(C)
$$\begin{aligned} S &\rightarrow Aa \mid B \\ A &\rightarrow Bb \mid Sc \mid \varepsilon \\ B &\rightarrow d \end{aligned}$$

(D)
$$\begin{aligned} S &\rightarrow Aa \mid Bb \mid c \\ A &\rightarrow Bd \mid \varepsilon \\ B &\rightarrow Ae \mid \varepsilon \end{aligned}$$

(A) A
(B) B
(C) C
(D) D

Q9. Consider a program P that consists of two source modules M1 and M2 contained in two different files. If M1 contains a reference to a function defined in M2 the reference will be resolved at

A. Edit time

B. Compile time

C. Link time

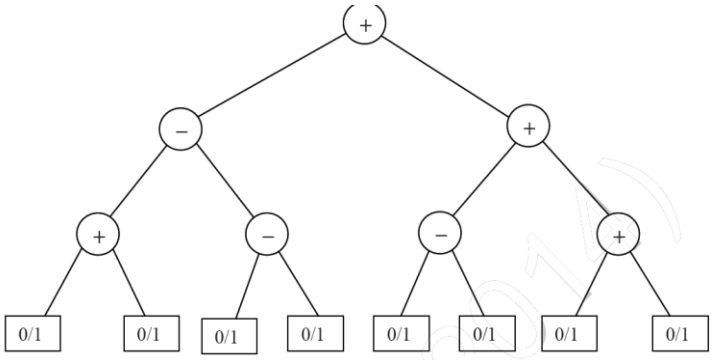
D. Load time

Q10. The number of tokens in the following C code segment is

```
1. switch(inputvalue)
2. {
3.     case 1 : b =c*d; break;
4.     default : b =b++; break;
5. }
```

a. 27
b. 29
c. 26
d. 24

Q11. Consider the expression tree shown. Each leaf represents a numerical value, which can either be 0 or 1. Over all possible choices of the values at the leaves, the maximum possible value of the expression represented by the tree is ___.



(A) 4
(B) 6
(C) 8
(D) 10

Q12 Find the number of tokens in the following C code::

```
1. main()
2. {
3.    int x = 10 , *P ;
4.    int y = x ++ ;
5.    char * q ;
6.    P = & x ; q = 'A' ;
7.    if(*P>=10)
8.    {
9.      *P = x + 100;
10.   }
11.   else
12.  {
13.    printf("%d" , x);
14.     /*comment*/
15.  }
16.
17.}
```

Q13. A lexical analyzer uses the following patterns to recognize three tokens T_1, T_2, and T_3 over the alphabet {a,b,c}.
T_1: a?(b|c)*a
T_2: b?(a|c)*b
T_3: c?(b|a)*c
Note that 'x?' means 0 or 1 occurrence of the symbol x. Note also that the analyzer outputs the token that matches the longest possible prefix.

If the string *bbaacabc* is processes by the analyzer, which one of the following is the sequence of tokens it outputs?
(A) $T_1T_2T_3$
(B) $T_1T_1T_3$
(C) $T_2T_1T_3$
(D) T_3T_3

Q14. Which one of the following statements is FALSE?
(A) Context-free grammar can be used to specify both lexical and syntax rules.
(B) Type checking is done before parsing.
(C) High-level language programs can be translated to different Intermediate Representations.
(D) Arguments to a function can be passed using the program stack.

Q15 Match the following:

(P) Lexical analysis	(i) Leftmost derivation
(Q) Top down parsing	(ii) Type checking
(R) Semantic analysis	(iii) Regular expressions
(S) Runtime environments	(iv) Activation records

(A) P ↔ i, Q ↔ ii, R ↔ iv, S ↔ iii

(B) P ↔ iii, Q ↔ i, R ↔ ii, S ↔ iv

(C) P ↔ ii, Q ↔ iii, R ↔ i, S ↔ iv

(D) P ↔ iv, Q ↔ i, R ↔ ii, S ↔ iii

Q16 The minimum number of arithmetic operations required to evaluate the polynomial $P(X) = X^5 + 4X^3 + 6X + 5$ for a given value of X using only one temporary variable_____.

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Answers

1	C
2	B
3	B
4	A
5	C
6	C
7	C
8	B
9	C
10	C
11	B
12	58
13	D
14	B
15	B
16	7