GATE

Computer Science & Information Technology

C - Programming

Data Types & Operators

DPP: 1

Q1 Which of the following is not a valid identifier?
(A) main (B) sizeof
(C) _PW (D) _PW_

Q2 Which of the following is not a keyword?
(A) goto (B) volatile
(C) main (D) unsigned

Q3 What is the output of below C Code?

```
void main()
{
int a=7,b=5,c,d;
c= a++ + ++b;
d= --b + a--;
printf("%d %d", d, c);
}
```

(A) 13, 12 (B) 12, 12
(C) 12, 13 (D) 13, 13

Q4 The output of below C code is _____

```
void main()
{
int i=9, j=12, k, x;
k=i=j;
x=i==j;
printf("%d %d", k, x);
}
```

(A) 9, 12 (B) 12, 1
(C) 12, 0 (D) 9, 0

Q5 The smallest individual element of any 'C' program is called as _____
(A) Variables
(B) Constants
(C) Tokens
(D) Keywords

Q6 Which of the below is not a 'C' Token?
(A) Identifiers (B) Keywords
(C) Operators (D) Expressions

Q7 Any number with fractional part is said to be _____
(A) Integer Constant
(B) Real Constant
(C) Character Constant
(D) String Constant

Q8 What will be the output of below 'C' code?

```
void main()
{
int i=+17, j=-7;
printf("%d,%d", i/j, i%j);
}
```

(A) –2, +3
(B) +2, –3
(C) +2, +3
(D) -2, –3

Q9 Identify the correct Precedence of below operators:
(I) ++ (Postfix)
(II) && (Logical AND)
(III) ^(Bitwise XOR)
(IV) >> (Right Shift)
(A) I, II, III, IV
(B) I, III, II, IV
(C) I, IV, II, III
(D) I, IV, III, II

Q10 Match the following:

LIST - I	LIST - II
A. ||	1. Relational
B. !=	2. Unary
C. +(sign)	3. Bitwise

(A) A-2, B-3, C-1
(B) A-3, B-2, C-1

(C) A-3, B-1, C-2
(D) A-2, B-1, C-3

Q11 Which of the below operators associativity is Right To Left?
(A) Shift Operators
(B) Logical Operators
(C) Prefix, Unary Operators
(D) Arithmetic Operators

Q12 Which combination of the integer variables x, y and z makes the variable a get the value 4 in the following expression?
a = (x > y) ? ((x > z) ? x : z) : ((y > z) ? y : z)
(A) x = 3, y = 4, z = 2
(B) x = 6, y = 5, z = 3
(C) x = 6, y = 3, z = 5
(D) x = 5, y = 4, z = 5

Q13 The output of below C code is _____

```
void main()
{
int x;
x= 7 + 4 * 5 / 2 - 2;
printf("%d", x);
```

(A) 15 (B) 13
(C) 25 (D) 11

Q14 The output of below code will be _____

```
void main()
{
int i=5, j=-3, k=0;
int x;
x= i ? j ? k ? k : i : j : k;
printf("%d", x);
}
```

(A) 0 (B) –3
(C) 5 (D) Error

Q15 Match The Following

List-I	List-II
a. &	1. Indirection
b. *	2. Arithmetic Division
c.->	3. Bitwise
d. >>	4. Member Access

(A) a-2, b-3, c-1, d-4
(B) a-3, b-1, c-2, d-4
(C) a-3, b-1, c-4, d-2
(D) a-3, b-4, c-1, d-2

Q16 What is the output of below code?

```
int main()
{ a
int a;
a= 18 + 43/2 * 3 >> 4 - 2;
printf("%d", a);
return 0;
}
```

(A) 3 (B) 4
(C) 5 (D) 20

GATE

Answer Key

Q1	(B)	Q9	(D)
Q2	(C)	Q10	(C)
Q3	(D)	Q11	(C)
Q4	(B)	Q12	(A)
Q5	(C)	Q13	(A)
Q6	(D)	Q14	(C)
Q7	(B)	Q15	(C)
Q8	(A)	Q16	(D)

Hints & Solutions

Q1 Text Solution:

In most programming languages, including C and C++, identifiers are names given to variables, functions, classes, etc. These names must follow certain rules:

1. They cannot be a keyword or reserved word of the programming language.
2. They must start with a letter (a to z or A to Z) or an underscore (_).
3. The subsequent characters can be letters, digits (09), or underscores.
4. Identifiers are case-sensitive. Based on these rules, the correct answer is: b. sizeof

Q2 Text Solution:

In the C programming language, "volatile" is a keyword used to declare that a variable can be modified unexpectedly by hardware or other parts of the program. On the other hand, "main", "goto", and "unsigned" are all keywords in C.

Therefore, the correct answer is:

c. main

Q3 Text Solution:

1. c = a++ + ++b;- a++ means post-increment, so a is used as 7 and then incremented to 8.- ++b means pre-increment, so b is incremented to 6 and then used as 6.- c = 7 + 6 = 1
2. d = --b + a--;---b means pre-decrement, so b is decremented to 5 and then used as 5.- a-- means post-decrement, so a is used as 8 and then decremented to 7.- d = 5 + 8 = 13 both d and c indeed result in 13. Therefore, the correct answer is: d. 13, 13

Q4 Text Solution:

i = 9 and j = 12 and assigns k and x later. In the statement k = i = j;, the value of j (12) is assigned to i, and then i (now 12) is assigned to k. Thus, k = 12. Next, in x = i == j;, the comparison i == j evaluates to true (since both are 12), so x = 1. Finally, the printf statement prints the values of k and x. Therefore, the output is:12 1. therefore option b is correct

Q5 Text Solution:

The smallest individual element of any 'C' program is called a token.

So, the correct answer is:

c. Tokens

Q6 Text Solution:

Among the options provided, "Expressions" is not a token in the C programming language. Expressions are combinations of operators, operands, and other expressions that evaluate to a single value. Tokens in C include identifiers, keywords, and operators, but expressions are not considered tokens themselves.

So, the correct answer is: d) Expressions

Q7 Text Solution:

Any number with a fractional part is said to be a real constant.

So, the correct answer is:

b. Real Constant

Q8 Text Solution:

1. i is assigned the value of positive 17 (+17).
2. j is assigned the value of negative 7 (-7).
3. The expression i/j is integer division, which in C truncates towards zero. So 17 / -7 results in -2.
4. The expression i%j calculates the remainder of the division 17 % -7, which is 3.

So, the output of the code will be:-2,3 which is option a.

Q9 Text Solution:

(I) ++ (Postfix)
(II) && (Logical AND)
(III) ^ (Bitwise XOR)
(IV) >> (Right Shift)
The correct order is: d. I, IV, III, II

Q10 Text Solution:

The correct matching is:
A. || - 1. Relational
B. != - 2. Unary
C. +(sign) - 3. Bitwise the correct match is: c. A-3, B-1, C-2

Q11 Text Solution:
The operator associativity that is Right to Left is:
c. Prefix, Unary Operators

Q12 Text Solution:
(A) x = 3, y = 4, z = 2 a = (3 > 4) ? ((3 > 2) ? 3 : 2) : ((4 > 2) ? 4 : 2)
Since x is not greater than y, the ternary expression evaluates to ((4 > 2) ? 4 : 2), which is 4.

(B) x = 6, y = 5, z = 3 a = (6 > 5) ? ((6 > 3) ? 6 : 3) : ((5 > 3) ? 5 : 3)
In this case, the first condition is true, so it evaluates to ((6 > 3) ? 6 : 3), which is 6.

(C) x = 6, y = 3, z = 5
a = (6 > 3) ? ((6 > 5) ? 6 : 5) : ((3 > 5) ? 3 : 5)
Again, the first condition is true, so it evaluates to ((6 > 5) ? 6 : 5), which is 6.

(D) x = 5, y = 4, z = 5
a = (5 > 4) ? ((5 > 5) ? 5 : 5) : ((4 > 5) ? 4 : 5)
The first condition is true, so it evaluates to ((5 > 5) ? 5 : 5), which is 5.
Therefore, the correct combination is (A) x = 3, y = 4, z = 2, which makes a equal to 4.

Q13 Text Solution:
x = 7 + 4 * 5 / 2 - 2
First, multiplication and division are performed from left to right:
4 * 5 = 20
20 / 2 = 10
Now, the expression becomes:
x = 7 + 10 - 2
Next, addition and subtraction are performed from left to right:
7 + 10 = 17
17 - 2 = 15
So, the value of x is 15.
Therefore, the correct answer is: a. 15

Q14 Text Solution:
The code uses nested ternary operators. Since i is non zero (true), it evaluates the expression after the first ?, which is j ? k ? k : i : j. The nested ternary operators lead to the value of i, which is 5. Therefore, the output is 5.

Q15 Text Solution:
a. & 3. Bitwise
The & operator is indeed a bitwise AND operator.
b. * 1. Indirection
The * operator is commonly used for indirection or dereferencing, especially with pointers.
c. -> 4. Member Access
The -> operator is used for member access instructures and unions.
d. >> 2. Arithmetic Division
The >> operator is used for right shift in bitwise operations.
Given this, the correct match is indeed:
C. a3, b1, c4, d2

Q16 Text Solution:
The output of the above program will be 20. : 43 / 2 evaluates to 21 (integer division).
21 * 3 results in 63.
63 >> 4 is a right shift operation by 4 bits, which effectively divides the value by 2^4 = 16. So, 63 >> 4 becomes 3.
Finally, 18 + 3 - 2 equals 20.
Therefore, the value of a is 20. Hence option d is correct.