DIGITAL LOGIC

Chapter - 1 : Number Systems

Q.1 Consider n-bit (including sign bit) 2's complement representation of integer numbers. The range of integer value N, that can be represented is $-2^{n-1} \le N \le 2^{n-1}-1$. **[GATE : 1994]**

Q.2 The number of 1's in the binary representation of (3*4096+15*256+5*16+3) is **[GATE : 1994]**

(A) 8 (B) 9 (C) 10 (D) 12

Q.3 The number 43 in 2's complement representation is **[GATE : 2000]**

(A) 01010101 (B) 11010101 (C) 00101011 (D) 10101011

Q.4 The decimal value 0.25 **[GATE : 2002]**

(A) Is equivalent to binary value 0.1 (B) Is equivalent to binary value 0.01

(C) Is equivalent to binary value 0.00111..... (C) Can not be represented precisely in binary

Q.5 The 2's complement representation of the decimal value – 15 is **[GATE : 2002]**

(A) 1111 (B) 11111 (D) 111111 (C) 10001

Q.6 Assuming all numbers are in 2's complement representation, which of the following numbers is divisible by 11111011? **[GATE : 2003]**

(A) 11100111 (B) 11100100 (C) 11010111 (D) 11011011

Q.7 If 73_x (in base - x number system) is equal to 54_y (in base - y number system), the possible values of x and y are **[GATE : 2004]**

(A) 8, 16 (B) 10, 12 (C) 9, 13 (D) 8, 11

Q.8 The range of integers that can be represented by an n bit 2's complement number system is: **[GATE : 2005]**

(A) -2^{n-1} to $+(2^{n-1}-1)$ (B) $-(2^{n-1}-1)$ to $(2^{n-1}-1)$

(C) -2^{n-1} to 2^{n-1} (D) $-(2^{n-1}+1)$ to $(2^{n-1}-1)$

Q.9 The hexadecimal representation of 657_8 is: **[GATE : 2005]**

(A) IAF (B) D78 (C) D71 (D) 32F

Q.10 Let r denote number system radix. The only value(s) of r that satisfy the equation $\sqrt{121_r} = 11_r$ is/are

[GATE : 2008]

(A) Decimal 10 (C) Decimal 11 (C) Decimal 10 and 11 (C) Any value > 2

Q.11 $(1217)_8$ is equivalent to **[GATE : 2009]**

(A) $(1217)_{16}$ (B) $(028F)_{16}$ (C) $(2297)_{10}$ (D) $(0B17)_{16}$

Q.12 The smallest integer that can be represented by an 8 – bit number in 2's complement form is

[GATE : 2013]

(A) – 256 (B) – 128 (C) – 127 (D) 0

Q.13 The base (or radix) of the number system such that the following equation holds is _____ $\frac{312}{20} = 13.1$

[GATE : 2014]

Q.14 Consider the equation $(123)_5 = (x8)_y$ with x and y as unknown. The number of possible solutions is _____. **[GATE : 2014]**

Q.15 The 16 –bit 2's complement representation of an integer is 1111 1111 1111 0101; its decimal representation is _____. **[GATE : 2016]**

Q.16 Let X be the number of distinct 16 – bit integers in 2's complement representation. Let Y be the number of distinct 16-bit integers in sign magnitude representation. Then X-Y is _____. **[GATE : 2016]**

Q.17 The representation of the value of a 16-bit unsigned integer X in hexadecimal number system is BCA9. The representation of the value of X in octal number system is **[GATE : 2017]**

(A) 571244 (B) 736251 (C) 571247 (D) 136251

Q.18 Consider the number given by the decimal expression. **[GATE : 1991]**

$16^3 \times 9 + 16^2 \times 7 + 16 \times 5 + 3$

The number of 1's in the unsigned binary representation of the number is

Q.19 Given $\sqrt{(224)_r} = (13)_r$,

The value of the radix' r is : **[GATE : 1997]**

(A) 10 (B) 8 (C) 5 (D) 6

Q.20 Zero has two representations in : **[GATE : 1999]**

(A) Sign magnitude (B) 1's complement (C) 2's complement (D) None of the above