Number Systems And Codes

1. The number of digits in octal systems are
   (a) 8 (c) 8 or 7
   (b) 7 (d) 10

Ans. (a)

2. The digit F in hexadecimal system has equivalence in digital system to
   (a) 16 (c) 17
   (b) 15 (d) 18

Ans. (b)

$(F)_{16} = 15 \times 16^0 = (15)_{10}$

3. The number FF in hexadecimal system has equivalence in decimal system to
   (a) 256 (c) 240
   (b) 255 (d) 239

Ans. (b)

$(FF)_{16} = 15 \times 16^1 + 15 \times 16^0 = 240 + 15 = 255$

4. Two voltages are 0V and -5V. In positive logic
   (a) 0V is 1 and -5V is 0
   (b) -5V is 1 and 0V is 0
   (c) 0V is 1 in some circuit and 0 in others
   (d) -5V is 1 in some circuit and 0 in others

Ans. (a)

In positive logic, higher voltage is represented as logic 1 and lower as logic 0

5. In the decimal number 27, the digit 2 represents
   (a) 2 (c) 0.2
   (b) 20 (d) 200

Ans. (b)

6. Hexadecimal number F is equal to octal number
   (a) 15 (c) 17
   (b) 16 (d) 18

Ans. (c)

$F = (\underline{1}\,\underline{111}) = (17)_8$

7. Binary number 1101 is equal to octal number
   (a) 17 (c) 15
   (b) 16 (d) 14

Ans. (c)

$(\underline{1}\,\underline{101})_2 = (15)_8$

8. -8 is equal to signed binary number (8 bit)
   (a) 10001000 (c) 1000000
   (b) 00001000 (d) 11000000

Ans. (a)

For signed binary number MSB is 1 for negative number.

9. 1's complement of 11100110 is
   (a) 00011001 (c) 00011010
   (b) 10000001 (d) 00000000

Ans. (a)

10. 2's complement of binary number 0101 is
    (a) 1011 (c) 1101
    (b) 1111 (d) 1110

Ans. (a)

Just complement the bits and add 1

$$\begin{array}{r} 1010 \\ +1 \\ \hline 1011 \end{array}$$

11. -24 is 2's complement form is

(a) 11101000 (c) 01111111

(b) 01001000 (d) 00111111

Ans. (a)

$(+24)_{10} = (00011000)_2$ 2's complement is $1110100 = (-24)_{10}$

Alternative and simple method to find 2's complement.

Write the $(+24)_{10} = (00011000)_2$

MSB LSB

↓ ↓

00011000

Stating from LSB copy all digits till first 1, then complement the further bits

$(-24)_{10}$ = 11101000 in 2's complement form

12. $7BF_{16} = (----)_2$

(a) 0111 1011 1110 (c) 0111 1011 0111

(b) 0111 1011 1111 (d) 0111 1011 0011

Ans. (b)

Convert each hexadecimal digit to binary

$(7BF)_{16} = (0111\ 1011\ 1111)_2$

13. $(E7F6)_{16} = (-----)_{10}$

(a) $(600000)_{10}$ (c) $(9382)_{10}$

(b) $(59382)_{10}$ (d) $(382)_{10}$

Ans. (b)

$(E7F6)_{16} = 14 \times 16^3 + 7 \times 16^2 + 15 \times 16^1 + 6 \times 16^0 = (59382)_{10}$

14. $268_{10} = (----)_{16}$

(a) 10 A_{16} (c) 10 C_{16}

(b) 10 B_{16} (d) 10 D_{16}

Ans. (c)

By observation one could see that

$(10C)_{16} = 1 \times 16^2 + 0 \times 16^1 + 12$

$= 256 + 12 = (268)_{10}$

Alternative method:

Convert decimal to Hex

Division	Remainder
16)268	-
16)16	12→C LSD
16)1	0
16)0	1↑ MSD

Remainder

Read the remainders from bottom to top $(10C)_{16}$

15. Convert $(47)_{16} = (\ )_8$

The hexadecimal number can be converted to decimal and decimal to octal, but the best way is

- Convert the number to its binary equivalent
- Form group of 3 bits starting from LSB
- Write the equivalent octal number

$(47)_{16}$ = (0100 0111)

Here each hex digit is written in a group of 4 binary bits

Like

$(4)_{16} \rightarrow (0100)_2$

$(7)_{16} \rightarrow (0111)_2$

Or $(47)_{16} = (\underline{01}\ \underline{000}\ \underline{111})_2$

$= (107)_8$

Similar steps can be used to convert the number from octal to hexadecimal

Ex. $(32)_8 = (011\ 010)_2$

$= (\underline{01}\ \underline{1010})_2$

$= (1\ A)_{16}$

16. The number of bits in ASCII is
    (a) 12 (c) 9
    (b) 10 (d) 7

Ans. (d)

17. The number of bits in EBCDIC is
    (a) 12 (c) 8
    (b) 10 (d) 6

Ans. (C)

18. FF_{16} when converted to 8421 BCD is
    (a) 0000 0101 0101 (c) 1111 0101 0101
    (b) 0010 0101 0101 (d) 1000 0101 0101

Ans. (b)

$FF_{16} = 15 \times 16^1 + 15 \times 16^0 = 240 + 15 = (255)_{10}$

Now represent each digit in BCD

19. Decimal number 9 in Gray code is
    (a) 1100 (c) 110
    (b) 1101 (d) 1111

Ans. (b)

$(9)_{10} = (1001)_2$

$1 \oplus 0 \oplus 0 \oplus 1$ Binary

$\downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow$

1 1 0 1 Gray

20. 11011 in gray code equal to binary

(a) $(10010)_2$ (c) $(11100)_2$

(b) $(11111)_2$ (d) $(10001)_2$

Ans. (a)