01. In the following series the same integer is expressed in different number system 10000, 121, 100, ?, 24, 22, 20, ... The missing number of the series is

(a) 23 (b) 32

(c) 31 (d) 13

(C) 25 Same int is expressed in different number System

10000, 121, 100, ?, 24, 22, 20, ——

(31)

Sol^n

$(10000)_2 = 1\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 0\times2^0$

$= 16$

$(121)_3 = 1\times3^2 + 2\times3^1 + 1\times3^0$

$= 16$

$(100)_4 = 1\times4^2 + 0\times4^1 + 0\times4^0$

$= 16$

$(31)_5 = 3\times5^1 + 1\times5^0$

$= 16$

$2\times5+3 = 13$ (X)

$3\times5+2 = 17$ (X)

$3\times5+1 = 16$ (✓)

$(24)_6 = 2\times6^1 + 4\times6^0$

$= 16$

$(22)_7 = 2\times7^1 + 2\times7^0$

$= 16$

$(20)_8 = 2\times8^1 + 0\times8^0$

$= 16$

(C) 31

02. In a digital computer binary subtraction is performed

(a) In the same way we perform subtraction in decimal number system

(b) Using two's complement method

(c) Using 9's complement method.

(d) Using 10's complement method.

(b) 2⇒ Binary subtraction performed —

(b) Using 2's complement method.

03. The smallest negative number which can be stored in a computer that has 8-bit word length and uses 2's complement arithmetic is

(a) –256 (b) –255

(c) –128 (d) –127

(c) 3⇒ Smallest -ve number, which can stored in 8-bit word length uses 2's complement -

Sol

(c) Smallest $= -2^{n-1}$ | $max = +(2^{n-1} - 1)$

$= -2^{8-1}$

$= -128$ | -128

04. Match List – I with List – II and select the *correct* answer using the codes given below the Lists:

List – I	**List – II**
A. 55	1. 1 0 1 0 0 0 0 0
B. 120	2. 1 1 0 1 1 1 0 0
C. 160	3. 0 1 1 1 1 0 0 0
D. 220	4. 0 0 1 1 0 1 1 1
	5. 1 0 1 0 1 1 0 1

Codes:

	A	B	C	D
(a)	3	4	5	2
(b)	4	3	1	2
(c)	4	3	5	2
(d)	3	4	2	1

(b) 4⇒

List - I	List - II
A) 55	128 64 32 16 8 4 2 1
B) 120	1) 1 0 1 0 0 0 0 0 → 160
C) 160	2) 1 1 0 1 1 1 0 0 → 220
D) 220	3) 0 1 1 1 1 0 0 0 → 120
	4) 0 0 1 1 0 1 1 1 → 55
	5) 1 0 1 0 1 1 0 1 → 173

(b) A → 4
B → 3
C → 1
D → 2

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05. The minimum decimal equivalent of the number $(11B)_x$ is

(a) 163 (b) 167

(c) 168 (d) 169

(b) 5=>

minimum decimal -

$(11B)_x = 1 \times x^2 + 1 \times x^1 + B \times x^0$

$= (x^2 + x + B)$

Base x must be greater than B.

x → (12)

B → (11) ← Henadesimal

$(11B)_{12} = x^2 + x + 11$

$= (12)^2 + 12 + 11$

$= 144 + 23$

(b) $= 167$

06. F's complement of $(2BFD)_{hex}$ is

(a) E304 (b) D403

(c) D402 (d) C403

Q 6⇒ F's complement -

$(2BFD)_{16}$ =

FFFF
- 2BFD
D402

07. A number is expressed in binary two's complement as 10011. Its decimal equivalent value is

(a) 19 (b) 13

(c) –19 (d) –13

(d) 7⇒ 2's of $(10011)_2$ →

(1) 00 11
- 1
0010 → 1's → 1101

1101 = -13

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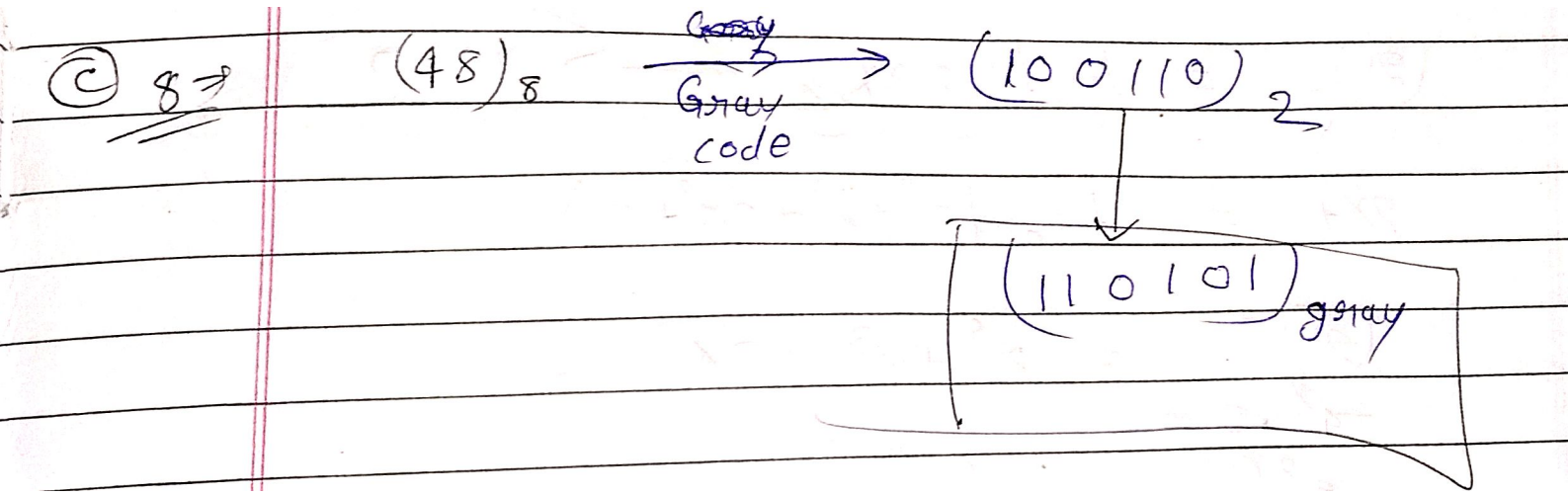
08. $(46)_8$ is expressed in Gray code as which one of the following?

(a) 110001

(b) 101000

(c) 110101

(d) 111110


(c) 8⇒
(48)8
Gray code
(100110)2
(110101)gray

09. The number of one's present in the binary representation of

$15 \times 256 + 5 \times 16 - 3$ are

(a) 8

(b) 9

(c) 10

(d) 11

(a) 9⇒ number of one's present in binary

$15 \times 256 + 5 \times 16 - 3$

$= 15 \times 16^2 + 5 \times 16^1 - 3 \times 16^0$

$= F \times 16^2 + 5 \times 16^1 - 3 \times 16^0 = (F50)_{16} - (003)_{16}$

$= (F4D)_{16}$

$= (1111\ 0100\ 1101)_2$

(a) No. of one's = 8 & zero's = 4

10. Find the value of x and y in the following equation

$$\sqrt{(4425)_x + (1750)_y} = (40)_x + (25)_y$$

(a) 5, 8

(b) 6, 9

(c) 6, 8

(d) 7, 8

(c) 10) $\int (9925)_x + (1750)_y = (90)_x + (25)_y$

$\therefore \int (9x^3 + 9x^2 + 2x + 5) + (y^3 + 7y^2 + 5y) = 4x + (2y + 5)$

$(9925)_x$ → x greater than 5 (6)

$(1750)_y$ → y greater than 7 (8)

(c) 6.8

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11. Find the value of x in the following equation

$(21)_x = \log_2 (11202)_x$

(a) 4 (b) 3

(c) 6 (d) 5

(b) الحل:

(21) $x = \log_2 (11202)_x$ $\longrightarrow x > 2$

$2x+1 = \log_2 (x^4 + x^3 + 2x^2 + 2)$

$2^{2x+1} = x^4 + x^3 + 2x^2 + 2$

~~$4^x \times 2 =$~~

$2^{2\times3+1} = (3^4 + 3^3 + 2\times3^2 + 2)$

$2^7 = 81 + 27 + 18 + 2$

$128 = 128$

(b) $x = 3$

12. Find the result in 2's complement form of the following

$$(1211)_4 + (1121)_3$$

(a) 10110000 (b) 11110000

(c) 01111000 (d) 01110000

(d) 12=? 2's complement = ?

$(1211)_4 + (1121)_3 = (1\times4^3+2\times4^2+1\times4^1+1) + (1\times3^3+1\times3^2+2\times3^1+1)$

$= 101 + 43$

$= (144)_{10}$

$= (10010000)_2$

2's

(d) (01110000)

13. Express −73.75 in 12 bit 2's complement form

(a) 11110110.0100

(b) 10110110.0100

(c) 01110110.0100

(d) 00110110.0100

(b) 13⇒ $-73.75 = ?$

64 32 16 8 4 2 1

0 1 0 01 001 . 1100 ⟶ (73.75)

↓ 1's

10110110.0011 ⟶ 2's → +1 = (b) 10110110.0100

14. What is the resultant of $(C4)_{16} - (7B)_{16} = ?$

(a) $(59)_{16}$ (b) $(39)_{16}$

(c) $(69)_{16}$ (d) $(49)_{16}$

(d) 14=>

$C4 = 11000100$

$-7B = +10000101$

$01000\ 1001$

$(49)_{16}$

(d) $(49)_{16}$

15. The given arithmetic operation is correct in at least one number system. Determine the base in the operation $\frac{302}{20} = 12.1$

(a) 2
(b) 10
(c) 6
(d) 4

(d) 45 ⇒ base = ?

$$\frac{(302)_b}{(20)_b} = (12.1)_b \Longrightarrow \frac{3b^2+2}{2b} = b+2+\frac{1}{b}$$

$$\frac{3b^2+2}{2b} = \frac{b^2+2b+1}{b}$$

$$b^2 - 4b + 1 = 0$$

$$b = 0, 4$$

(d) 4

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16. What is the equivalent Hexadecimal representation of $(10110010)_{gray}$?

(a) $(AB)_{16}$ (b) $(BC)_{16}$

(c) $(DC)_{16}$ (d) $(CA)_{16}$

(c) 16=>

$(10110010)_{gray} = (11011100)_2$

(c) $(DC)_{16}$

17. What is the addition of $(32)_{10}$ and $(76)_8$?

(a) $(94)_{10}$

(b) $(60)_{16}$

(c) $(77)_8$

(d) $(10011100)_2$

(9) 17⇒ $(32)_{10} + (76)_8$

$= 32 + 7 \times 8 + 6$

$= 32 + 62$

(9) $= (94)_{10}$