

## **TYPE-B:DATA HANDLING:CH-2**

### **TYPE B : APPLICATION BASED QUESTIONS**

1. Convert the following binary numbers to decimal :      (a) 1101      (b) 111010      (c) 10101111
2. Convert the following binary numbers to decimal :      (a) 1100      (b) 10010101      (c) 11011100
3. Convert the following decimal numbers to binary :      (a) 23      (b) 100      (c) 145      (d) 0.25
4. Convert the following decimal numbers to binary :      (a) 19      (b) 122      (c) 161      (d) 0.675
5. Convert the following decimal numbers to octal :      (a) 19      (b) 122      (c) 161      (d) 0.675
6. Convert the following hexadecimal numbers to binary :      (a) A6      (b) A07      (c) 7AB4
7. Convert the following hexadecimal numbers to binary :      (a) 23D      (b) BC9      (c) 9BC8
8. Convert the following binary numbers to hexadecimal :  
 (a) 10011011101      (b) 1111011101011011      (c) 11010111010111
9. Convert the following binary numbers to hexadecimal :  
 (a) 1010110110111      (b) 10110111011011      (c) 0110101100
10. Convert the following octal numbers to decimal :      (a) 257      (b) 3527      (c) 123      (d) 605.12
11. Convert the following hexadecimal numbers to decimal :      (a) A6      (b) A13B      (c) 3A5
12. Convert the following hexadecimal numbers to decimal :      (a) E9      (b) 7 CA3
13. Convert the following decimal numbers to hexadecimal :      (a) 132      (b) 2352      (c) 122      (d) 0.675
14. Convert the following decimal numbers to hexadecimal :      (a) 206      (b) 3619
15. Convert the following hexadecimal numbers to octal :  
 (a) 38 AC      (b) 7FD6      (c) ABCD
16. Convert the following octal numbers to binary :      (a) 123      (b) 3527      (c) 705
17. Convert the following octal numbers to binary :  
 (a) 7642      (b) 7015      (c) 3576      (d) 705
18. Convert the following binary numbers to octal :  
 (a) 111010      (b) 110110101      (c) 1101100001
19. Convert the following binary numbers to octal :  
 (a) 11001      (b) 10101100      (c) 111010111
20. Given that A's code point in ASCII is 65, and a's code point is 97. What is the binary representation of 'A' in ASCII ? (and what's its hexadecimal representation). What is the binary representation of 'a' in ASCII ?
21. Convert the following binary numbers to decimal, octal and hexadecimal numbers.  
 (i) 100101.101      (ii) 10101100.01011  
 (iii) 1010      (iv) 10101100.010111

$$\begin{aligned}
 1) (a) (1101)_2 &= (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) \\
 &= 8 + 4 + 0 + 1 \\
 &= (13)_{10}
 \end{aligned}$$

$$\begin{aligned}
 1)(b) (111010)_2 &= (1 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) \\
 &= 32 + 16 + 8 + 0 + 2 + 0 \\
 &= (58)_{10}
 \end{aligned}$$

$$\begin{aligned}
 1)(c) (101011111)_2 &= (1 \times 2^8) + (0 \times 2^7) + (1 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \\
 &= 256 + 0 + 64 + 0 + 16 + 8 + 4 + 2 + 1 \\
 &= (351)_{10}
 \end{aligned}$$

$$\begin{aligned}
 2)(a) (1100)_2 &= (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (0 \times 2^0) \\
 &= 8 + 4 + 0 + 0 \\
 &= (12)_{10}
 \end{aligned}$$

$$\begin{aligned}
 2)(b) (10010101)_2 &= (1 \times 2^7) + (0 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) \\
 &= 128 + 0 + 0 + 16 + 0 + 4 + 0 + 1 \\
 &= (149)_{10}
 \end{aligned}$$

$$\begin{aligned}
 2)(c) (11011100)_2 &= (1 \times 2^7) + (1 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (0 \times 2^0) \\
 &= 128 + 64 + 0 + 16 + 8 + 4 + 0 + 0 \\
 &= (220)_{10}
 \end{aligned}$$

3)(a)

| Division    | Result | Remainder |
|-------------|--------|-----------|
| $23 \div 2$ | 11     | 1         |
| $11 \div 2$ | 5      | 1         |
| $5 \div 2$  | 2      | 1         |
| $2 \div 2$  | 1      | 0         |
| $1 \div 2$  | 0      | 1         |

$$\text{ans: } 23_{10} = 10111_2$$

3)(b)

| Division     | Result | Remainder |
|--------------|--------|-----------|
| $100 \div 2$ | 50     | 0         |
| $50 \div 2$  | 25     | 0         |
| $25 \div 2$  | 12     | 1         |
| $12 \div 2$  | 6      | 0         |
| $6 \div 2$   | 3      | 0         |
| $3 \div 2$   | 1      | 1         |
| $1 \div 2$   | 0      | 1         |

$$\text{ans: } 100_{10} = 1100100_2$$

3(c)

| Division     | Result | Remainder |
|--------------|--------|-----------|
| $145 \div 2$ | 72     | 1         |
| $72 \div 2$  | 36     | 0         |
| $36 \div 2$  | 18     | 0         |
| $18 \div 2$  | 9      | 0         |
| $9 \div 2$   | 4      | 1         |
| $4 \div 2$   | 2      | 0         |
| $2 \div 2$   | 1      | 0         |
| $1 \div 2$   | 0      | 1         |

$$\text{ans: } 145_{10} = 10010001_2$$

3)(d)

| Step | Number $\times$ 2 | Result | Integer Part |
|------|-------------------|--------|--------------|
| 1    | $0.25 \times 2$   | 0.5    | 0            |
| 2    | $0.5 \times 2$    | 1.0    | 1            |

$$\text{ans: } 0.25_{10} = 0.01_2$$

4)(a)

| Division    | Result | Remainder |
|-------------|--------|-----------|
| $19 \div 2$ | 9      | 1         |
| $9 \div 2$  | 4      | 1         |
| $4 \div 2$  | 2      | 0         |
| $2 \div 2$  | 1      | 0         |
| $1 \div 2$  | 0      | 1         |

$$\text{ans: } 19_{10} = 10011_2$$

4)(b)

| Division     | Result | Remainder |
|--------------|--------|-----------|
| $122 \div 2$ | 61     | 0         |
| $61 \div 2$  | 30     | 1         |
| $30 \div 2$  | 15     | 0         |
| $15 \div 2$  | 7      | 1         |
| $7 \div 2$   | 3      | 1         |
| $3 \div 2$   | 1      | 1         |
| $1 \div 2$   | 0      | 1         |

$$\text{ans: } 122_{10} = 1111010_2$$

4)(c)

| Division     | Result | Remainder |
|--------------|--------|-----------|
| $161 \div 2$ | 80     | 1         |
| $80 \div 2$  | 40     | 0         |
| $40 \div 2$  | 20     | 0         |
| $20 \div 2$  | 10     | 0         |
| $10 \div 2$  | 5      | 0         |
| $5 \div 2$   | 2      | 1         |
| $2 \div 2$   | 1      | 0         |
| $1 \div 2$   | 0      | 1         |

$$\text{ans: } 161_{10} = 10100001_2$$

4)(d)

| Step | Number $\times$ 2 | Result | Integer Part |
|------|-------------------|--------|--------------|
| 1    | $0.675 \times 2$  | 1.35   | 1            |
| 2    | $0.35 \times 2$   | 0.70   | 0            |
| 3    | $0.70 \times 2$   | 1.40   | 1            |
| 4    | $0.40 \times 2$   | 0.80   | 0            |
| 5    | $0.80 \times 2$   | 1.60   | 1            |
| 6    | $0.60 \times 2$   | 1.20   | 1            |
| 7    | $0.20 \times 2$   | 0.40   | 0            |
| 8    | $0.40 \times 2$   | 0.80   | 0            |
| 9    | $0.80 \times 2$   | 1.60   | 1            |
| 10   | $0.60 \times 2$   | 1.20   | 1            |

$$\text{ans: } 0.675_{10} \approx 0.1010110011_2$$

5)(a)

| Division    | Result | Remainder |
|-------------|--------|-----------|
| $19 \div 8$ | 2      | 3         |
| $2 \div 8$  | 0      | 2         |

$$\text{ans: } 19_{10} = 23_8$$

5)(b)

| Division     | Result | Remainder |
|--------------|--------|-----------|
| $122 \div 8$ | 15     | 2         |
| $15 \div 8$  | 1      | 7         |
| $1 \div 8$   | 0      | 1         |

$$\text{ans: } 122_{10} = 172_8$$

5(c)

| Division     | Result | Remainder |
|--------------|--------|-----------|
| $161 \div 8$ | 20     | 1         |

|             |   |   |
|-------------|---|---|
| $20 \div 8$ | 2 | 4 |
| $2 \div 8$  | 0 | 2 |

$$\text{ans: } 161_{10} = 241_8$$

5)(d)

| Step | Number $\times 8$ | Result | Integer Part |
|------|-------------------|--------|--------------|
| 1    | $0.675 \times 8$  | 5.4    | 5            |
| 2    | $0.4 \times 8$    | 3.2    | 3            |
| 3    | $0.2 \times 8$    | 1.6    | 1            |
| 4    | $0.6 \times 8$    | 4.8    | 4            |
| 5    | $0.8 \times 8$    | 6.4    | 6            |
| 6    | $0.4 \times 8$    | 3.2    | 3 (repeats)  |

$$\text{ans: } 0.675_{10} = 0.53146_8$$

### **hexadecimal to binary table : ( basic table for all sums )**

| Hexadecimal | Binary |
|-------------|--------|
| 0           | 0000   |
| 1           | 0001   |
| 2           | 0010   |
| 3           | 0011   |
| 4           | 0100   |
| 5           | 0101   |
| 6           | 0110   |
| 7           | 0111   |
| 8           | 1000   |
| 9           | 1001   |
| A           | 1010   |
| B           | 1011   |
| C           | 1100   |
| D           | 1101   |
| E           | 1110   |
| F           | 1111   |

6)(a)  $A_{16} = 1010_2$

$$6_{16} = 0110_2$$

$$A6_{16} = 10100110_2$$

6)(b)  $A_{16} = 1010_2$

$$0_{16} = 0000_2$$

$$7_{16} = 0111_2$$

$$A07_{16} = 101000000111_2$$

6)(c)  $7_{16} = 0111_2$

$$A_{16} = 1010_2$$

$$B_{16} = 1011_2$$

$4_{16} = 0100_2$   
 $7AB4_{16} = 0111101010110100_2$

7)(a)  $2_{16} = 0010_2$   
 $3_{16} = 0011_2$   
 $D_{16} = 1101_2$   
 $23D_{16} = 001000111101_2$

7)(b)  $B_{16} = 1011_2$   
 $C_{16} = 1100_2$   
 $9_{16} = 1001_2$   
 $BC9_{16} = 101111001001$

7)(c)  $9_{16} = 1001_2$   
 $B_{16} = 1011_2$   
 $C_{16} = 1100_2$   
 $8_{16} = 1000_2$   
 $9BC8_{16} = 1001101111001000_2$

8)(a)  $0100_2 = 4_{16}$   
 $1101_2 = D_{16}$   
 $1101_2 = D_{16}$   
 $10011011101_2 = 4DD_{16}$

8)(b)  $1111_2 = F_{16}$   
 $0111_2 = 7_{16}$   
 $0101_2 = 5_{16}$   
 $1011_2 = B_{16}$   
 $1111011101011011_2 = F75B_{16}$

8)(c)  $0011_2 = 3_{16}$   
 $0101_2 = 5_{16}$   
 $1101_2 = D_{16}$   
 $0111_2 = 7_{16}$   
 $11010111010111_2 = 35D7_{16}$

9)(a)  $0001_2 = 1_{16}$   
 $0101_2 = 5_{16}$   
 $1011_2 = B_{16}$   
 $0111_2 = 7_{16}$   
 $1010110110111_2 = 15B7_{16}$

9)(b)  $0010_2 = 2_{16}$   
 $1101_2 = D_{16}$   
 $1101_2 = D_{16}$   
 $1011_2 = B_{16}$   
 $10110111011011_2 = 2DDB_{16}$

9)(c)  $0001_2 = 1_{16}$

$$\begin{aligned}1010_2 &= A_{16} \\1100_2 &= C_{16} \\0110101100_2 &= 1AC_{16}\end{aligned}$$

$$\begin{aligned}10)(a) 257_8 &= (2 \times 8^2) + (5 \times 8^1) + (7 \times 8^0) \\&= (2 \times 64) + (5 \times 8) + (7 \times 1) \\&= 128 + 40 + 7 \\&= 175_{10}\end{aligned}$$

$$\begin{aligned}10)(b) 3527_8 &= (3 \times 8^3) + (5 \times 8^2) + (2 \times 8^1) + (7 \times 8^0) \\&= (3 \times 512) + (5 \times 64) + (2 \times 8) + (7 \times 1) \\&= 1536 + 320 + 16 + 7 \\&= 1879_{10}\end{aligned}$$

$$\begin{aligned}10)(c) 123_8 &= (1 \times 8^2) + (2 \times 8^1) + (3 \times 8^0) \\&= (1 \times 64) + (2 \times 8) + (3 \times 1) \\&= 64 + 16 + 3 \\&= 83_{10}\end{aligned}$$

$$\begin{aligned}10)(d) 605.12_8 &= (6 \times 8^2 + 0 \times 8^1 + 5 \times 8^0 + 1 \times 8^{-1} + 2 \times 8^{-2}) \\&= (6 \times 64 + 0 \times 8 + 5 \times 1 + 1/8 + 2/64) \\&= (384 + 0 + 5 + 0.125 + 0.03125) \\&= 389.15625_{10}\end{aligned}$$

$$\begin{aligned}11)(a) A6_{16} &= (A \times 16^1) + (6 \times 16^0) \\&= (10 \times 16) + (6 \times 1) \\&= 160 + 6 \\&= 166_{10}\end{aligned}$$

$$\begin{aligned}11)(b) A13B_{16} &= (A \times 16^3) + (1 \times 16^2) + (3 \times 16^1) + (B \times 16^0) \\&= (10 \times 4096) + (1 \times 256) + (3 \times 16) + (11 \times 1) \\&= 40960 + 256 + 48 + 11 \\&= 41275_{10}\end{aligned}$$

$$\begin{aligned}11)(c) 3A5_{16} &= (3 \times 16^2) + (A \times 16^1) + (5 \times 16^0) \\&= (3 \times 256) + (10 \times 16) + (5 \times 1) \\&= 768 + 160 + 5 \\&= 933_{10}\end{aligned}$$

$$\begin{aligned}12)(a) E9_{16} &= (E \times 16^1) + (9 \times 16^0) \\&= (14 \times 16) + (9 \times 1) \\&= 224 + 9 \\&= 233_{10}\end{aligned}$$

$$\begin{aligned}12)(b) CA3_{16} &= (C \times 16^2) + (A \times 16^1) + (3 \times 16^0) \\&= (12 \times 256) + (10 \times 16) + (3 \times 1) \\&= 3072 + 160 + 3 \\&= 3235_{10}\end{aligned}$$

$$13)(a) 132 \div 16 = 8 \text{ remainder } 4$$

$$8 \div 16 = 0 \text{ remainder } 8$$

$$132_{10} = 84_{16}$$

$$13)(b) 2352 \div 16 = 147 \text{ remainder } 0$$

$$147 \div 16 = 9 \text{ remainder } 3$$

$$9 \div 16 = 0 \text{ remainder } 9$$

$$2352_{10} = 930_{16}$$

$$13)(c) 122 \div 16 = 7 \text{ remainder } 10 \text{ (A)}$$

$$7 \div 16 = 0 \text{ remainder } 7$$

$$122_{10} = 7A_{16}$$

$$13)(d) 0.675 \times 16 = 10.8 \rightarrow A$$

$$0.8 \times 16 = 12.8 \rightarrow C$$

$$0.8 \times 16 = 12.8 \rightarrow C \text{ (repeating)}$$

$$0.675_{10} \approx 0.ACC_{16}$$

$$14)(a) 206 \div 16 = 12 \text{ remainder } 14 \text{ (C E)}$$

$$12 \div 16 = 0 \text{ remainder } 12 \text{ (C)}$$

$$206_{10} = CE_{16}$$

$$14)(b) 3619 \div 16 = 226 \text{ remainder } 3$$

$$226 \div 16 = 14 \text{ remainder } 2$$

$$14 \div 16 = 0 \text{ remainder } 14 \text{ (E)}$$

$$3619_{10} = E23_{16}$$

***octal to binaey table : ( basic table for all sums )***

| Octal | Binary |
|-------|--------|
| 0     | 000    |
| 1     | 001    |
| 2     | 010    |
| 3     | 011    |
| 4     | 100    |
| 5     | 101    |
| 6     | 110    |
| 7     | 111    |

$$15)(a) 3_{16} = 0011_2$$

$$8_{16} = 1000_2$$

$$A_{16} = 1010_2$$

$$C_{16} = 1100_2$$

$$38AC_{16} = 0011100010101100_2$$

$$0011100010101100_2 \rightarrow 001\ 110\ 001\ 010\ 110\ 0$$

$$38AC_{16} = 161260_8$$

15)(b)  $7_{16} = 0111_2$   
 $F_{16} = 1111_2$   
 $D_{16} = 1101_2$   
 $6_{16} = 0110_2$   
 $7FD6_{16} = 011111111010110_2$   
 $011111111010110_2 \rightarrow 000\ 111\ 111\ 111\ 010\ 110$   
 $7FD6_{16} = 177266_8$

15)(c)  $A_{16} = 1010_2$   
 $B_{16} = 1011_2$   
 $C_{16} = 1100_2$   
 $D_{16} = 1101_2$   
 $ABCD_{16} = 1010101111001101_2$   
 $1010101111001101_2 \rightarrow 001\ 010\ 101\ 111\ 001\ 101$   
 $ABCD_{16} = 125715_8$

16)(a)  $1_8 = 001_2$   
 $2_8 = 010_2$   
 $3_8 = 011_2$   
 $123_8 = 001010011_2$

16)(b)  $3_8 = 011_2$   
 $5_8 = 101_2$   
 $2_8 = 010_2$   
 $7_8 = 111_2$   
 $3527_8 = 011101010111_2$

16)(c)  $7_8 = 111_2$   
 $0_8 = 000_2$   
 $5_8 = 101_2$   
 $705_8 = 111000101_2$

17)(a)  $7_8 = 111_2$   
 $6_8 = 110_2$   
 $4_8 = 100_2$   
 $2_8 = 010_2$   
 $7642_8 = 111110100010_2$

17)(b)  $7_8 = 111_2$   
 $0_8 = 000_2$   
 $1_8 = 001_2$   
 $5_8 = 101_2$   
 $7015_8 = 111000001101_2$

17)(c)  $3_8 = 011_2$   
 $5_8 = 101_2$   
 $7_8 = 111_2$   
 $6_8 = 110_2$

$3576_8 = 011101111110_2$

17)(d)  $7_8 = 111_2$

$0_8 = 000_2$

$5_8 = 101_2$

$705_8 = 111000101_2$

18)(a)  $111 = 7_8$

$010 = 2_8$

$111010_2 = 72_8$

18)(b)  $110 = 6_8$

$110 = 6_8$

$101 = 5_8$

$110110101_2 = 665_8$

18)(c)  $001 = 1_8$

$101 = 5_8$

$100 = 4_8$

$001 = 1_8$

$1101100001_2 = 1541_8$

19)(a)  $011 = 3_8$

$001 = 1_8$

$11001_2 = 31_8$

19)(b)  $010 = 2_8$

$101 = 5_8$

$100 = 4_8$

$10101100_2 = 254_8$

19)(c)  $111 = 7_8$

$010 = 2_8$

$111 = 7_8$

$111010111_2 = 727_8$

20) ASCII value of 'A' = 65

Binary of 'A' = 01000001

Hexadecimal of 'A' = 41

ASCII value of 'a' = 97

Binary of 'a' = 01100001