

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

### TYPE B : APPLICATION BASED QUESTIONS

1. Convert the following binary numbers to decimal : (a) 1101 (b) 111010 (c) 101011111
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) 01101011100
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

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

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

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

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

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

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

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

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

5)(a)

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

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

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

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)

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)  $7_{16} = 0111_2$   
 $A_{16} = 1010_2$   
 $B_{16} = 1011_2$

$$4_{16} = 0100_2$$

$$7AB4_{16} = 0111101010110100_2$$

$$7)(a) \ 2_{16} = 0010_2$$

$$3_{16} = 0011_2$$

$$D_{16} = 1101_2$$

$$23D_{16} = 001000111101_2$$

$$7)(b) \ B_{16} = 1011_2$$

$$C_{16} = 1100_2$$

$$9_{16} = 1001_2$$

$$BC9_{16} = 101111001001$$

$$7)(c) \ 9_{16} = 1001_2$$

$$B_{16} = 1011_2$$

$$C_{16} = 1100_2$$

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

$$9BC8_{16} = 1001101111001000_2$$

$$8)(a) \ 0100_2 = 4_{16}$$

$$1101_2 = D_{16}$$

$$1101_2 = D_{16}$$

$$10011011101_2 = 4DD_{16}$$

$$8)(b) \ 1111_2 = F_{16}$$

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

$$0101_2 = 5_{16}$$

$$1011_2 = B_{16}$$

$$1111011101011011_2 = F75B_{16}$$

$$8)(c) \ 0011_2 = 3_{16}$$

$$0101_2 = 5_{16}$$

$$1101_2 = D_{16}$$

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

$$11010111010111_2 = 35D7_{16}$$

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

$$0101_2 = 5_{16}$$

$$1011_2 = B_{16}$$

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

$$1010110110111_2 = 15B7_{16}$$

$$9)(b) \ 0010_2 = 2_{16}$$

$$1101_2 = D_{16}$$

$$1101_2 = D_{16}$$

$$1011_2 = B_{16}$$

$$10110111011011_2 = 2DDB_{16}$$

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

$$1010_2 = A_{16}$$

$$1100_2 = C_{16}$$

$$0110101100_2 = 1AC_{16}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$A_{16} = 1010_2$$

$$C_{16} = 1100_2$$

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

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



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

$$15)(b) 7_{16} = 0111_2$$

$$F_{16} = 1111_2$$

$$D_{16} = 1101_2$$

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

$$7FD6_{16} = 011111111010110_2$$

$$011111111010110_2 \rightarrow 000\ 111\ 111\ 111\ 010\ 110$$

$$7FD6_{16} = 177266_8$$

$$15)(c) A_{16} = 1010_2$$

$$B_{16} = 1011_2$$

$$C_{16} = 1100_2$$

$$D_{16} = 1101_2$$

$$ABCD_{16} = 1010101111001101_2$$

$$1010101111001101_2 \rightarrow 001\ 010\ 101\ 111\ 001\ 101$$

$$ABCD_{16} = 125715_8$$

$$16)(a) 1_8 = 001_2$$

$$2_8 = 010_2$$

$$3_8 = 011_2$$

$$123_8 = 001010011_2$$

$$16)(b) 3_8 = 011_2$$

$$5_8 = 101_2$$

$$2_8 = 010_2$$

$$7_8 = 111_2$$

$$3527_8 = 011101010111_2$$

$$16)(c) 7_8 = 111_2$$

$$0_8 = 000_2$$

$$5_8 = 101_2$$

$$705_8 = 111000101_2$$

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

$$6_8 = 110_2$$

$$4_8 = 100_2$$

$$2_8 = 010_2$$

$$7642_8 = 111110100010_2$$

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

$$0_8 = 000_2$$

$$1_8 = 001_2$$

$$5_8 = 101_2$$

$$7015_8 = 111000001101_2$$

$$17)(c) 3_8 = 011_2$$

$$5_8 = 101_2$$

$$7_8 = 111_2$$

$$6_8 = 110_2$$

$$3576_8 = 011101111110_2$$

$$17)(d) 7_8 = 11_2$$

$$0_8 = 00_2$$

$$5_8 = 10_2$$

$$705_8 = 111000101_2$$

$$18)(a) 111 = 7_8$$

$$010 = 2_8$$

$$111010_2 = 72_8$$

$$18)(b) 110 = 6_8$$

$$110 = 6_8$$

$$101 = 5_8$$

$$110110101_2 = 665_8$$

$$18)(c) 001 = 1_8$$

$$101 = 5_8$$

$$100 = 4_8$$

$$001 = 1_8$$

$$1101100001_2 = 1541_8$$

$$19)(a) 011 = 3_8$$

$$001 = 1_8$$

$$11001_2 = 31_8$$

$$19)(b) 010 = 2_8$$

$$101 = 5_8$$

$$100 = 4_8$$

$$10101100_2 = 254_8$$

$$19)(c) 111 = 7_8$$

$$010 = 2_8$$

$$111 = 7_8$$

$$111010111_2 = 727_8$$

$$20) \text{ ASCII value of 'A' } = 65$$

$$\text{Binary of 'A' } = 01000001$$

$$\text{Hexadecimal of 'A' } = 41$$

$$\text{ASCII value of 'a' } = 97$$

$$\text{Binary of 'a' } = 01100001$$