

① What is hexa decimal of  $(988999)_{10}$

$\begin{array}{r} 16 \\ \hline 988999 \end{array}$  Remainder

$\begin{array}{r} 16 \\ \hline 6181244 \end{array}$

6 ((Conversion))

$\begin{array}{r} 16 \\ \hline 386327 \end{array}$

13 E ↑

$\begin{array}{r} 16 \\ \hline 24145 \end{array}$

7 7 ↑

$\begin{array}{r} 16 \\ \hline 1509 \end{array}$

1 1 ↑

$\begin{array}{r} 16 \\ \hline 94 \end{array}$

5 5 ↑

$\begin{array}{r} 16 \\ \hline 5 \end{array}$

14 → E

Start dividing  
by 16 and  
write remainder  
in right hand  
side.

Write in this direction

Ans - 5E17C6

2 Convert following as indicated and V.V.  
(a - h) questions.

a.) Solution -

$$(1101)_2 = (?)_8$$

$$1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 =$$

$$= 8 + 4 + 0 + 1 =$$

Now convert it in octal

$$\begin{array}{r} 8 \longdiv{1} 3 & \text{Remainder } \\ \underline{-1} & \\ \hline & 5 \end{array}$$

$$(1101)_2 = (15)_8$$

Cross Verify.

$$(15)_8 = (7)_{10}$$

$$= 1 \times 8^1 + 5 \times 8^0$$

$$= (13)_{10}$$

$$\begin{array}{r}
 = 2 \mid 13 \\
 \underline{- 6} \quad \mid 1 \\
 \underline{\underline{- 12}} \quad \mid 0 \\
 \underline{\underline{\underline{- 12}}} \quad \mid 7
 \end{array}$$

$$= (1011)_2$$

Ques. Part (b)

$$\begin{aligned}
 & 2^{11}x^1 + 2^{10}x_1 + 2^9x_1 + 2^8x_1 + 2^7x_1 + 2^6x_1 + 2^5x_1 + 2^4x_1 + 2^3x_1 + 2^2x_1 + 2^1x_1 + 2^0x_0 = (?)_{10} \\
 & 2048 + 1024 + 512 + 256 + 128 + 64 + 32 + 16 + 8 + 4 + 2 + 0 \\
 & = (4094)_{10}
 \end{aligned}$$

Now let's verify

$\frac{2}{2} 4094$

2	0
0	4
1	0
1	1
1	1
1	1
1	1
1	1
1	1
1	1
1	1
1	1
1	0

Ans

1110



Hence proved.

Ques. part C.)

Apply same previous method.

$$(221201)_3 \Rightarrow (?)_{10}$$

Convert

Cross Verify.

$$2 \quad 2 \quad 1 \quad 2 \cdot 0 \cdot 1 \\ 2 \times 3^5 + 2 \times 3^4 + 1 \times 3^3 + 2 \times 3^2 + 0 \times 3^1 + 1 \times 3^0$$

$$= 486 + 162 + 27 + 18 + 0 + 1 \\ = (494)_{10}$$

Cross Verify

3   444	3   694
3   164	3   231
3   54	3   71 0
3   18	3   25 2
3   6	3   8 1
	2 2

$$(221201)_3 \checkmark$$

Ques - 2      Part (d)

$$(76)_8 = (?)_{10}$$

Simply  $(76)_8$

$$7 \times 8^1 + 6 \times 8^0$$

$$56 + 6$$

Ans.  $(62)_{10}$

Cross verify.

$$\begin{array}{r} 8 \\ \hline 62 \\ 6 \end{array}$$

$$(76)_8$$

Simple ✓.

Ques 2 - part e

$$(231)_8 = (?)_2$$

Convert in decimal.

$$(231)_8$$

$$2 \times 8^2 + 3 \times 8^1 + 1 \times 8^0$$

$$128 + 24 + 1$$

$$152 + 1$$

$$(153)_{10}$$

$$\begin{array}{r} 153 \\ \hline 2 | 76 \quad 1 \\ 2 | 38 \quad 0 \\ 2 | 19 \quad 1 \\ 2 | 9 \quad 1 \\ 2 | 4 \quad 1 \\ 2 | 2 \quad 0 \\ \hline & 1 \quad 0 \end{array}$$

Ans  $(10011001)_2$

Cross verify.

$$100\cdot11\ 001 \quad \text{Do proof}$$

by threes

digit method.

$$\begin{array}{r} 100\ 11001 \\ \hline 2 \quad 2+1 \quad 1 \\ 2 \quad 3 \quad 1 \end{array}$$

$$(231)_8$$

$$\begin{array}{r} 2^6 \ 2^5 \ 2^4 \ 2^3 \ | 2^2 \ 2^1 \ 2^0 \\ 8 \quad 4 \quad 2 \quad 1 \end{array}$$

METHOD ONLY USE THIS

Ques 2 - part (f)

$$(F00)_{16} \Rightarrow (?)_8$$

Convert

$$\begin{array}{r} F \quad 0 \quad 0 \\ \times 16^2 + 0 \times 16^1 + 0 \times 16^0 \\ \hline 3840 + 0 + 0 \end{array}$$

$$(3840)_{10}$$

$$\begin{array}{r} 3840 \\ 480 \quad 0 \\ 60 \quad 0 \\ \hline 1 \quad 4 \end{array}$$

$$\text{Ans. } (7400)_8$$

Coars Verify.

~~$$\begin{array}{r} 18 \quad 2700 \\ 10 \quad 740 \quad 0 \\ \hline 74 \quad \text{Sorry} \end{array}$$~~

Simply,

$$\begin{array}{r} 7 \quad 4 \quad 0 \quad 0 \\ 7 \times 8^3 + 4 \times 8^2 + 0 \times 8^1 + 0 \times 8^0 \\ = (3840)_{10} \end{array}$$

$$\begin{array}{r} 3840 \\ 240 \quad 0 \\ \hline 15 \quad 0 \end{array}$$

$$\boxed{\begin{array}{r} 0 \quad 0 \quad 15 \quad 7 \quad 8 \\ (00\ 0) \\ \hline (F\ 0\ 0) \end{array}} \rightarrow (F00)_{16}$$

Ques 2 - part (g)

$$(DACE)_{16} \Rightarrow (?)_{12}$$

First convert in decimal.

Simple.

$$\begin{array}{r} D A E \\ 16^3 \times 13 + 16^2 \times 10 + 16^1 \times 12 + 16^0 \times 14 \\ = 53248 + 2560 + 192 + 14 \\ = (56014)_{10} \end{array}$$

$$\begin{array}{r} 12 | 56014 \\ 12 | 4667 \quad 10 \\ 12 | 388 \quad 11 \\ 12 | 32 \quad 4 \\ 12 | 2 \quad 8 \end{array}$$

$$(2\cancel{8}4 \quad \underline{11} \quad \underline{10})_{12}$$

Our

if.  $10 \rightarrow A, 11 \rightarrow B, 12 \rightarrow C$

then  $(284BA)_{12}$

Ans.  $(284BA)_{12}$

(Ans verified)

$$(284BA)$$

$$\begin{aligned} & 2 \times 12^3 + 8 \times 12^2 + 4 \times 12^1 + 10 \times 12^0 \\ & 12^3 \times 2 + 12^2 \times 8 + 12^1 \times 4 + 12^0 \times 10 \\ & 41472 + 13824 + 576 + 132 + 10 \\ & = 56014 \end{aligned}$$

Now in hexadecimal.

$$\begin{array}{r} 16 | 56014 \\ 16 | 3500 \quad 14 \\ 16 | 218 \quad 12 \\ 16 | 13 \quad 10 \end{array}$$

$$(13101214)$$

↓

$$(DACE)_{16}$$

Proved

Ques 2. part h.)

$$(2B)_{16} \Rightarrow (?)_8$$

Convert in decimal.

$$\begin{array}{r} (2 \ B) \\ 2 \times 16^1 + 16^0 \times 11 \end{array}$$

$$32 + 11$$

$$(43)_{10} \text{ Now in octal}$$

$$\begin{array}{r} 8 \mid 43 \\ \hline 5 \quad 3 \end{array}$$

$$\text{Ans. } (53)_8$$

(Ans Verify)

$$(53)_8 = \text{to decimal}$$

$$8^1 \times 5 + 3 \times 8^0$$

$$40 + 3 \times 1$$

$$(43)_{10}$$

Now in Hexadecimal

$$\begin{array}{r} 16 \mid 43 \\ \hline 2 \quad 11 \end{array}$$

$$(2 \ B)_{16} \quad (\text{Found})$$

Question 3

Convert the following to base 10, (A to E).

$$\text{Ques 3 part A} \rightarrow (3312)_8 = (?)_{10}$$

$$\begin{array}{r} 3 \ 3 \ 1 \ 2 \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 3 \times 8^3 + 3 \times 8^2 + 8^1 \times 1 + 2 \times 8^0 \\ 1536 + 192 + 8 + 2 \\ \text{Ans. } (1738)_{10} \quad \checkmark \end{array}$$

Qun 3. part b)  $(167)_8 = (?)_{10}$

$$\begin{aligned} & \begin{array}{r} 1 \quad 6 \quad 7 \\ \times 8^2 + 6 \times 8^1 + \end{array} \xrightarrow{\quad} 7 \times 8^0 \\ = & 64 + 48 + 7 \\ = & (119)_{10} \quad \text{Ans.} \end{aligned}$$

Qun 3 part c)  $(202103)_9$

$$\begin{array}{r} 2 \quad 0 \quad 2 \quad 1 \quad 0 \quad 3 \\ 2 \times 9^5 + 0 \times 9^4 + 2 \times 9^3 + 1 \times 9^2 + 0 \times 9^1 + 3 \times 9^0 \\ 59049 \quad 0 + 1458 + 81 + 0 + 3 \\ (60591)_{10} \quad \text{Any way } (60591)_{10} \end{array}$$

Qun 4 part d)  
 $(3132334)_{16}$

$$\begin{array}{ccccccc} 3. & 1 & 3. & 2 & 3. & 13 & 4 \\ 3 \times 16^6 + 1 \times 16^5 + 3 \times 16^4 + 2 \times 16^3 + 3 \times 16^2 + 3 \times 16^1 + & \xrightarrow{\quad} & 4 \times 16^0 \\ \xrightarrow{\quad} 50331648 + 1048576 + 196608 + 768 + & & \\ = & (51585844)_{10} & \end{array}$$

Ques 4)

part - C

$$(5610)_{10} = (?)_8$$

$$\begin{array}{r} 5610 \\ \hline 8 | 701 \quad 2 \\ \hline 8 | 87 \quad 5 \\ \hline 8 | 10 \quad 7 \\ \hline 1 \quad 2 \end{array}$$

$$(12752)_8$$

Answer

$$(5610)_{10} \rightarrow (?)_8$$

$$(5610)_{10} = (?)_{12}$$

$$\begin{array}{r} 5610 \\ \hline 12 | 467 \quad 6 \\ \hline 12 | 38 \quad 11 \\ \hline 3 \quad 2 \end{array}$$

$$09(32\frac{11}{B}6)_{12}$$

Answer.

$$\{(01011001011110)\}$$

Ques 4 part e

$$(5610)_{10} = (?)_{16}$$

$$\begin{array}{r} 5610 \\ \hline 16 | 350 \quad 10 \\ \hline 16 | 21 \quad 14 \\ \hline 1 \quad 5 \end{array}$$

$$(15EA)_{10} =$$

Answer

Ques 4 part e.

$$(22110)_{10} = (?)_2$$

$$\begin{array}{r} 22110 \\ \hline 2 | 110550 \\ \hline 2 | 55271 \\ \hline 2 | 27631 \\ \hline 2 | 13811 \\ \hline 2 | 6901 \\ \hline 2 | 3450 \\ \hline 2 | 1721 \\ \hline 2 | 860 \\ \hline 2 | 430 \\ \hline 2 | 211 \\ \hline 2 | 101 \\ \hline 2 | 50 \\ \hline 2 | 21 \\ \hline 1 \quad 0 \end{array}$$

Ans.

Ques 4

$$\text{Part (g)} (22110)_{10} = (?)_3$$

$$\begin{array}{r}
 3 | 22110 \\
 3 | 7370 \quad 0 \\
 2 | 2456 \quad 2 \\
 3 | 818 \quad 2 \\
 3 | 272 \quad 2 \\
 3 | 90 \quad 2 \\
 \hline
 3 | 30 \quad 0 \\
 3 | 10 \quad 0 \\
 \hline
 & 3 \quad 1 \\
 \hline
 & 1 \quad 0
 \end{array}$$

$$(1010022220)_3$$

Ques 4 Part i

$$[22110]_{10} = (?)_{12}$$

$$\begin{array}{r}
 12 | 22110 \\
 12 | 1842 \quad 6 \\
 12 | 153 \quad 6 \\
 12 | 12 \quad 9 \\
 \hline
 & 1 \quad 0
 \end{array}$$

$$(10966)_{12}$$

Answer

- Part (h).

$$\begin{array}{r}
 8 | 22110 \\
 8 | 2763 \quad 6 \\
 8 | 345 \quad 3 \\
 8 | 43 \quad 1 \\
 \hline
 & 5 \quad 3
 \end{array}$$

$$(53136)_8$$

Answer

Ques 4.

Part  $\rightarrow$  J.)

$$(22110)_{10} \rightarrow (?)_{16}$$

$$\begin{array}{r}
 16 | 22110 \\
 16 | 1381 \quad 14 - E \\
 16 | 86 \quad 14 - S \\
 \hline
 & 5 \quad 16
 \end{array}$$

$$(565E)_{16}$$

Answer

5.) Convert the following numbers.

to binary, base 3, octal and  
hexadecimal. Any fraction that  
do not terminate should be truncated  
to 4 digits in fractional part.

1.) a.)

$$(34.34)_{10} = (?)_2$$

Integer Part

$$\begin{array}{r} \underline{2|34} \\ 2 | 17 \quad 0 \\ \underline{2|8} \quad 1 \\ \underline{2|4} \quad 0 \\ \underline{2|2} \quad 0 \\ + 0 \end{array}$$

$$(100010)_2$$

Fraction Part

$$\begin{array}{r} (0.34) \times 2 \\ 0 \quad 0.68 \times 2 \\ 1 \\ \underline{0} \quad 0.32 \times 2 \\ 1 \\ \underline{0} \quad 0.64 \times 2 \\ 1 \\ \underline{0} \quad 0.28 \times 2 \\ 0 \quad 0.56 \times 2 \end{array}$$

$$0101$$

4 digits

$$\text{Answer } (100010.0101)_2$$

$$b.) (34.34)_{10} = (?)_3$$

$$\begin{array}{r} 3|34. \\ \underline{3|11} \quad 1 \\ \underline{3|3} \quad 2 \\ + 0 \end{array}$$

$$(1021)_3$$

$$0.34$$

$$0.34 \times 3$$

$$1 \cdot 09 \times 3$$

$$0 \cdot 06 \times 3$$

$$0 \cdot 18 \times 3$$

$$0 \cdot 54 \times 3$$

$$(1021.1000)_3 \text{ Ans.}$$

$$c) (34.34)_{10} = (?)_8$$

~~(34.34)~~

$\begin{array}{r} 34 \\ \times 8 \\ \hline 4 \quad 2 \\ (42)_8 \end{array}$	$0 \cdot 34$
	$0 \cdot 34 \times 8$ <del><math>0 \cdot 72</math></del> $\times 8$
	$5 \quad 0 \cdot 76 \times 8$
	$6 \quad 0 \cdot 08 \times 8$ $0 \quad 0 \cdot 64$

$(42.0560)_8$  Answer

$$d) (34.34)_{16} = (?)_{16}$$

~~(34.34)~~

$\begin{array}{r} 34 \\ \times 16 \\ \hline 9 \quad 2 \\ 2 \quad 2 \end{array}$	$0 \cdot 34 \times 16$ <del><math>0 \cdot 84</math></del> $\times 16$ $0 \quad 0 \cdot 64 \times 16$ $10 \quad 0 \cdot 24 \times 16$
	$5 \quad 0 \cdot 84 \times 16$ $7 \quad 0 \cdot 64 \times 16$ $0 \quad 0 \cdot 24 \times 16$ $570A$

$(Q2.570A)_{16}$

$$e) a) (125.125)_{10} = (?)_2$$

$\begin{array}{r} 125 \\ \times 2 \\ \hline 62 \quad 1 \\ 31 \quad 0 \\ 15 \quad 1 \\ 7 \quad 1 \\ 3 \quad 1 \\ 1 \quad 1 \\ (111101)_2 \end{array}$	$0 \cdot 125 \times 2$ $0 \cdot 0 \cdot 25 \times 2$ $0 \cdot 0 \cdot 5 \times 2$ $1 \cdot 0 \cdot 0 \times 2$ $(111101 \cdot 001)_2$ Answer
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Qun 2 part b  $(125 \cdot 125)_{10} = (\underline{\hspace{2cm}})_3$  ?

$$\begin{array}{r} 3 | 125 \\ \hline 3 | 412 \\ \hline 3 | 132 \\ \hline 41 \\ \hline 11 \end{array}$$

$(11122)$

$$\begin{array}{r} 0 \cdot 125 \times 3 \\ 00 \cdot 375 \times 3 \\ 0 \cdot 125 \times 3 \\ 0 \cdot 375 \times 3 \\ 1 \cdot 0 \cdot 125 \times 3 \end{array}$$

$(\cancel{11122}) (11122 \cdot 0101)_3$

Answer. ?

Qun 2 part c

$(125 \cdot 125)_{10} = (\underline{\hspace{2cm}})_8$

$$\begin{array}{r} 8 | 125 \\ \hline 8 | 155 \\ \hline 8 | 17 \\ \hline 175 \end{array}$$

$(175 \cdot 1)_8$

Qun 2 part d  $= (125 \cdot 125)_{10} = (?)_{16}$

$$\begin{array}{r} 16 | 125 \\ \hline 16 | 713 \\ \hline 16 | 71 \\ \hline 71 \end{array}$$

$$\begin{array}{r} 0 \cdot 125 \times 16 \\ 0 \cdot 0 \end{array}$$

$(70 \cdot 2)_{16}$  Answer

# Ques 5 Part 3:

Part a

$$(10.16)_{10} = (?)_2$$

$\begin{array}{r} 10 \\ \times 2 \\ \hline 10 \end{array}$	$0.16 \times 2$ $0 \quad 0.32 \times 2$ $0 \quad 0.64 \times 2$ $1 \quad 0.28 \times 2$ $0, \quad 0.56 \times 2$ $0, \quad 0.12$
--	---

1010       $(1010.00101)_2$  Answer

This is still 5 digit

Part b  $(10.16)_{10} = (?)_3$

$\begin{array}{r} 10 \\ \times 3 \\ \hline 31 \\ -3 \\ \hline 10 \end{array}$	$0.16 \times 3$ $0 \quad 0.48 \times 3$ $1 \quad 0.44 \times 3$ $1 \quad 0.32 \times 3$ $0 \quad 0.96 \times 3$ $2$
---	--

$(101.01102)_3$  5 digit

Part c

$$(0.16)_{10} = (?)_8$$

$\begin{array}{r} 10 \\ \times 8 \\ \hline 12 \end{array}$	$0.16 \times 8$ $1 \quad 0.28$ $2 \quad 0.24$ $1 \quad 0.92$
--	---

$(12.1217)_8$

Ques 5 part 3  $\rightarrow$  d

$$(10 \cdot 16)_{10} = (P)_{16}$$

16	10	

$$0.16 \times 16$$

$$2 \quad 0.56$$

$$8 \quad 0.96$$

$$15 \quad 0.36$$

$$5 \quad 0.76$$

$$(A \cdot 28.5)_{16} \checkmark$$

Answer.

New Question

Question 6. What is largest +ve no one can represent in 12-bit 2's complement code? Write result in binary and decimal

Answer  $\rightarrow$  In 12 bit as for

2's complement 1 digit is

saved for (sign) so

Largest possible no.

$$\text{(-1)}_{10} (0\cancel{1}\cancel{1}\cancel{1}\cancel{1}\cancel{1}\cancel{1}\cancel{1}\cancel{1}\cancel{1}) \rightarrow$$

$$2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$$

$$= (2047)_{10} \checkmark \text{ Answer}$$

Question -7. What are the 8 bit patterns used to each of character in string "CODEITS. 2019)

Answer.

8 bits

Decimal

C =	67	<u>01000011</u>
O =	79	<u>01001111</u>
D =	68	<u>01000100</u>
E =	69	<u>01000101</u>
I =	47	<u>00101111</u>
T =	84	<u>01010100</u>
H =	72	<u>01001000</u>
S =	83	<u>01010011</u>
Space =	32	<u>00100000</u>

9 = 1001  
 0 = 0000  
 2 = 0010  
 0 = 0000

10 = 1010  
 18 = 10010  
 50 = 110010  
 48 = 101111

Question 8 → What is biggest binary  
 can be written with 5 bits?

Answer →  $[11111]_2$

Answer.

Question 9 → In hex,  $2BFC + 54A7$

$$\begin{aligned}
 & 2 \times 16^3 + 11 \times 16^2 + 15 \times 16^1 + 12 \times 16^0 + 5 \times 16^3 + 4 \times 16^2 + 10 \times 16^1 + 7 \times 16^0 \\
 & 2 \times 4096 + 2816 + 240 + 12 + 5 \times 4096 + 1024 + 160 + 7 \\
 & = (32931)_{10}
 \end{aligned}$$

again

$$\begin{array}{r} 16 \Big| 3293 \\ 2 \Big| 2058 \quad 3 \\ 16 \Big| 128 \quad 10 \rightarrow A \\ 8 \quad 0 \end{array}$$

HEX value  
 $(80A3)_{16}$   
Answer ✓

Ques  $\rightarrow$  Convert the hex number ABC7  
to binary.

$$(A \ B \ C \ 7) \rightarrow$$

$$10 \times 16^3 + 11 \times 16^2 + 12 \times 16^1 + 7 \times 16^0$$

$$40960 + 2816 + 192 + 7$$

$$= (43975)_{10}$$

$$\begin{array}{r} 2 \Big| 43975 \\ 2 \Big| 21987 \quad 1 \\ 2 \Big| 10993 \quad 1 \\ 2 \Big| 5496 \quad 1 \\ 2 \Big| 2748 \quad 0 \\ 2 \Big| 1374 \quad 0 \\ 2 \Big| 687 \quad 0 \\ 2 \Big| 343 \quad 1 \\ 2 \Big| 171 \quad 1 \\ 2 \Big| 85 \quad 1 \\ 2 \Big| 42 \quad 1 \\ 2 \Big| 21 \quad 0 \\ 2 \Big| 10 \quad 1 \\ 2 \Big| 5 \quad 0 \\ 2 \Big| 2 \quad 1 \\ 2 \Big| 1 \quad 0 \end{array}$$

Answer  
10101110000110

Ques 11 In hex,  $A\ C74 - B3F$

$$\begin{array}{r} A \ C \\ - B \ 3 \\ \hline 7 \ 4 \end{array} \quad \begin{array}{r} 7 \ 4 \end{array} - \begin{array}{r} B \ 3 \end{array} \quad \begin{array}{r} F \end{array}$$
$$10 \times 16^3 + 12 \times 16^2 + 7 \times 16^1 + 4 \times 16^0 - 11 \times 16^2 + 3 \times 16^1 + 16^0 \times 15$$
$$40960 + 3072 + 112 + 4 - 8816 + 48 + 15$$

$$= (41269)_{10}$$

$$\begin{array}{r} 16 \overline{)41269} \\ 16 \overline{)2579} - 5 \\ 16 \overline{)161} - 3 \\ 16 \overline{)10} - 1 \\ \hline (A135)_{16} \end{array}$$

Answer

Ques 12 Convert the following binary fractions to ordinary fraction

$$\text{Answer} \rightarrow 0.001$$

$$\begin{array}{r} \downarrow 1 \times 2^{-1} + 0 \times 2^{-2} + 2^{-3} \times 0 + 1 \times 2^{-4} \\ \frac{1}{2} + \frac{1}{16} \\ \hline \frac{9}{16} \end{array} \quad \text{or} \quad 0.125 + 0.0625$$
$$\text{or} \quad (0.5625)_{10}$$

(Answer)

b)  $1.001$

$$\begin{array}{r} 1 \times 2^0 + \left| \begin{array}{r} 0 \times 2^1 + 0 \times 2^2 + 1 \times 2^{-3} \\ 0 + 0 + \frac{1}{8} \\ 0 + 0 + 0.125 \end{array} \right. \\ \hline \end{array}$$

$$\begin{array}{r} 1 + \frac{1}{8} \\ \hline \frac{9}{8} \end{array} \quad \text{or} \quad \begin{array}{r} 1 + 0.125 \\ \hline 1.125 \end{array}$$

Answer

Ques 12  $\rightarrow$  C

$$1 + \overline{1111}$$

$$1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2} + 1 \times 2^{-3} + 1 \times 2^{-4}$$

$$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} = \cancel{\frac{31}{16}}$$

$$\frac{16 + 8 + 4 + 2 + 1}{16} = \frac{31}{16}$$

1st Answer

Or

$$1 + 0.5 + 0.25 + 0.125 + 0.0625$$

$$= (1.9375)_{10} \quad \text{Answer.}$$

Ques 13 Decimal expansion of  $11/17$  is

0.647 - Find binary expansion of  $11/17 \rightarrow$

$$(0.647)_{10} = (?)_2$$

$$(0.647) \times 2$$

<del>0.647</del>	1	0.294
0	0	0.588
1	0	0.176
0	0	0.352
1	0	0.704
0	1	0.408
0	1	0.816
1	1	0.632
1	1	0.264
0	0	0.528
1	0	0.056
0	0	0.112

and on and on  $\swarrow$

Question 14 → Decimal expansion 0.2727

Find the binary expansion —

$$0.2727 \times 2$$

$$\begin{array}{r} 0 + \\ 1 \\ \hline 0.5454 \end{array}$$

$$\begin{array}{r} 1 \\ 0 \\ \hline 0.0908 \end{array}$$

$$\begin{array}{r} 0 \\ 1 \\ \hline 0.1816 \end{array}$$

$$\begin{array}{r} 0 \\ 1 \\ \hline 0.3632 \end{array}$$

$$\begin{array}{r} 0 \\ 1 \\ \hline 0.7264 \end{array}$$

$$\begin{array}{r} 1 \\ 0 \\ \hline 0.4528 \end{array}$$

$$\begin{array}{r} 0 \\ 1 \\ \hline 0.9056 \end{array}$$

$$\begin{array}{r} 1 \\ 0 \\ \hline 0.8112 \end{array}$$

$$\begin{array}{r} 1 \\ 0 \\ \hline 0.6224 \end{array}$$

Continue like same

$$(0.010001011\dots)_2$$

Qn 15 → Same as Qn 13

Qn 16 → Same as Qn 14

## New Question

~~Ques~~ Note

- 18.) How many bits are in IPv4 and IPv6
- Ans. An IPv4 address has 32-bit binary no.
- An IPv6 address has 128-bit binary no.

17.) Answer → It is a loopback internet protocol address also referred to as local host. The address is ~~also~~ used to establish IP connection to the same machine or computer being used by the end user.

- 19.) Convert this IP address in decimal binary
- Ans.

$$11000000 \cdot 10010000 \cdot 00001010 \cdot 00001010$$

$\downarrow 2^7 + 2^6$      $\downarrow 2^7 + 2^4$      $\swarrow 2^3 + 2^1$      $\nwarrow 2^5 + 2^1$

$$192 \cdot 144 \cdot 10 \cdot 10 \quad \text{Ans.}$$

- (20.) What is range of IPv4 addresses?
- 1.) IPv4 address is 32 bit system can have  $2^{32}$  unique addresses.

It has five classes.

Class	First Octet Range	Network	Hosts
A	1-127	$2^7 - 2 = 126$	$2^{24} - 2 = 16777214$
B	128-191	$2^{14} = 16384$	$2^{16-2} = 65534$
C	192-223	$2^{21} = 2097152$	$2^{8-2} = 254$
D	224-239		
	240-255		

Q1) Explain classification of IP addresses?

Answer An IP address can be classified in two types →

- 1.) IPv4
- 2.) IPv6

1) IPv4 → IPv4 is first version developed by ARPANE T, most used IP version, It allows  $2^{34}$  addresses.

Further classify in 5 classes.

Explained above in Q10 question.

An IPv4 address can be divided into two parts

— Network Id

— Host Id.

	1 <sup>st</sup> byte	2 <sup>nd</sup> byte	3 <sup>rd</sup> byte	4 <sup>th</sup> byte
Class A	NET ID		HOST ID	
Class B	NET ID		HOST ID	
Class C	NET ID			HOST ID
Class D			Multicast address	
Class E			Reserved.	

Q) IPv6 It is most recent version of IP.

It has 128 bit space, can save upto  $2^{128}$  unique address.

It is alpha numeric address, whose binary bits are separated by colon(:).

Qn 22.) Why we running out of IP v4 addresses.

Answer → As we can use only  $2^{32}$  ( 4,294,967,296 ) addresses and current population is 7,648,290,381. There are not enough addresses to give one add. to everyone. Many have laptop, gaming console, TV and cell phone.

Ques 23 → Can a device has both IPv4 and IPv6 address?

Answer → Yes, By use of dual stack operation.

Ques 24 → IPv4 classification is done on which octet?

Answer → IPv4 classification done on first octet of IPv4 add'l. format.

Ques 25 → Class E IP addresses are currently used for?

Answer → Class E IP address is used for R and D or Study. IP addresses in this class ranges from 240.0.0.0 to 255.255.255.254.

Ques 26 → IP addresses 124.255.255.1 belong to Class D address. (IPv4)  
Ans.

Ques 27 → <sup>Answer</sup> private address concept developed to address the IP exhaustion problem

The private IP add. can be used on prvt. Network of any organization in world that are not globally unique.

There are three ranges of add. →

- 10.0.0.0 - 10.255.255.255
- 172.16.0.0 - 172.31.255.255
- 192.168.0.0 - 192.168.255.255

Ques 28 → Any differentiation b/w Private IP Network and public network can be done by looking at its ranges are fixed for private Networks. So private network can be recognized just by looking over it.

Ques 29. Ans →

Port → A port is communication endpoint. A port is logical construct and that identifies a specific process or a type of network service. Ports are identified for each protocol and address combination by 16-bit

unsigned no., known as port no.

Port no. → A port no. is 16-bit unsigned integer, thus ranging from 0 to 65535

For TCP port no. 32768 is reserved.

A process associates its input or output channels via an Internet socket, with a transport protocol, an IP address and a port no.

Question - 30 Ans →

HTTP → 80

FTP → Data - 20, Control - 21

HTTPS → 443

SMTP → 25

Question 31 → A web server is server soft or hardware dedicated to running this software, that can satisfy client request. The primary function of web server is to store, process and deliver web pages to clients.

Client → A client is who make requests in HTTP format to web and receive response in HTTP format.

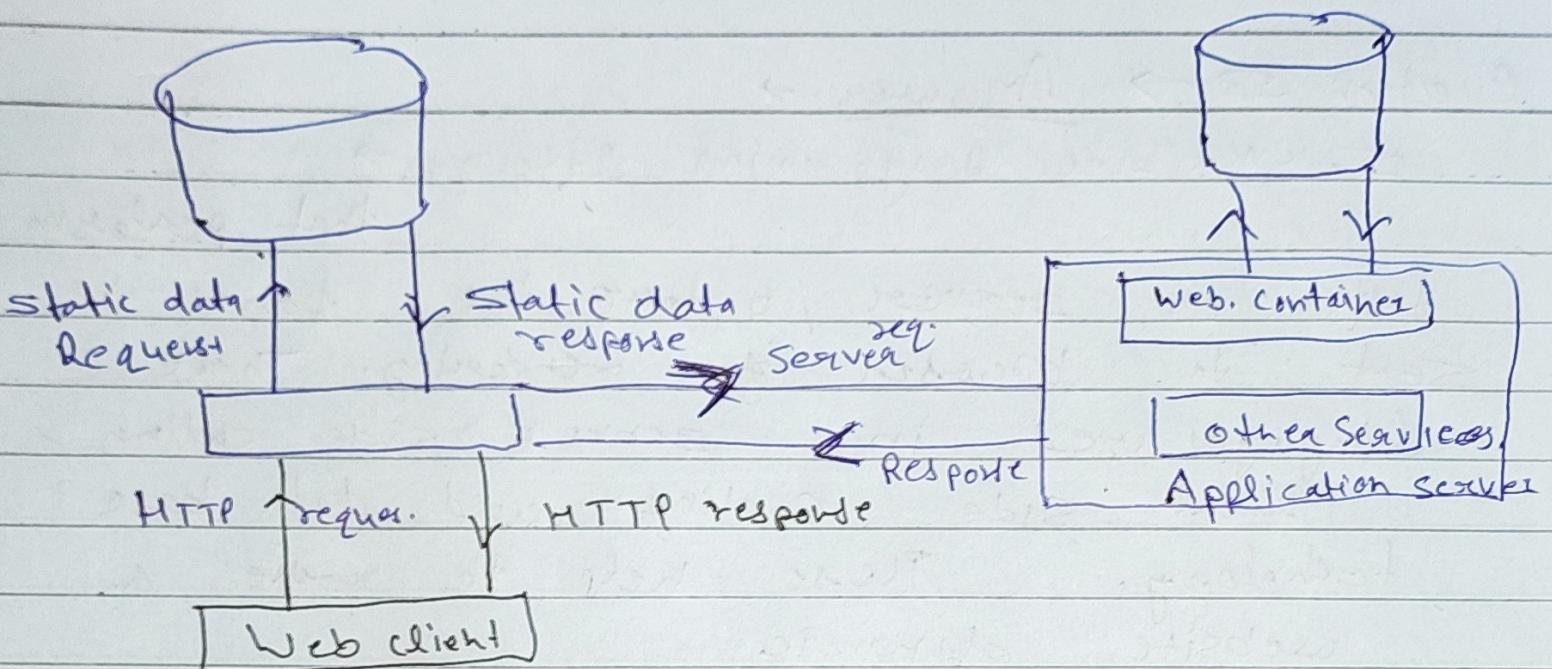
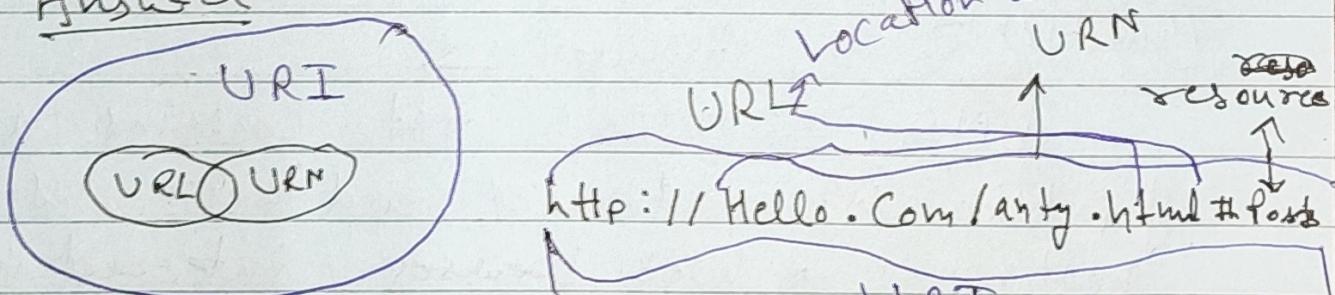


Fig - Web server client working.

~~Ques 32~~ Command →

\$ python -m SimpleHTTPServer

32.) Answer



URI → identifies a resource (image, file)

URL → is a subset of URIs that include

URN → is a subset of URIs that include a name within a given space but no location.

Question 33 → Answer →

Server side programming languages →

that perform

task on server, before the page is sent to browser for rendering. These languages used in server side coding - client side coding and data base technology. These help to make a website dynamic.

Example - PHP, ASP.NET, C++, Python.

Question 34 → Answer →

Yes, mostly Java script used as client side programming language.

Question 35 → Answer →

DNS server that contains a database of public IP addresses and their associated host names. Web browser interact through internet protocol addresses. DNS translates domain names to IP addresses. DNS eliminates need to remember IP addresses.

## DNS → 8 steps.

- query given by client travel into internet and received by DNS recursive resolver
- Resolver queries a DNS root name server.
- Root server respond to resolver with TLD DNS server.
- The resolver query .com TLD
- The TLD server responds with IP address of domain's name server
- resolver query to domain's name server
- resolve get ip address and respond to web browser.

Root servers → Authoritative name servers that serve DNS root zone. There are 13 different IP addresses that serve DNS root zone

Question - 36 — Answer →

DNS Spoofing → is an attack in which altered DNS records are used to redirect online traffic to a faddish website that resembles its intended destination  
y)

## Methods →

- 1.) MITM → The interception of communication b/w users and a DNS server in order to route users to a different/malicious add.
- 2.) DNS server compromise → Direct hijacking of DNS server which is configured to return a malicious add.

Question - 37 - Answer →

## HTTP STATUS CODES →

HTTP status code is 3 digit integer, where first digit is used to defines the class of response.  
It indicates if a specific HTTP request completed else why not what happens.

Responses are grouped in five classes →

- (100 - 199) — Informational responses.
- (200 - 299) — Successful responses
- (300 - 399) — Redirects
- (400 - 499) — Client errors
- (500 - 599) — Server errors.

HTTP request methods ~~are~~ are used to indicate desired action be performed for a given resource.

- GET → to request a representation of the specified resource. ~~Req~~ Requests using ~~get~~ GET should only retrieve data.
- HEAD → method for ask identical to that of a get request.
- POST → Method is used to submit an entity to specified resource.
- PUT → To replace all current representation of target resource with the request payload.
- Delete → To delete specified resource
- Connect → Method establishes a tunnel to the server identified by target resource.
- Option - to the communication option
- Trace → To perform message loop back test along path to the target.
- Patch. → Partial Modification.  
→ Please note all request are capital letters.

502 - Bad gateway

200 - Ok.

400 - Bad request

201 - Created.

Question - 38 -

Model View Controller → MVC is architectural pattern that separates an application into three main logical components.

Model → It corresponds to all data related logic that the user works with. This can represent that is being transferred, the view and controller or any other business logic related.

View → Used for UI logic of application.

Controller → It acts as interface between model and view component to process all the business logic and incoming requests, manipulate data using the model component and interact with view to render final output.

Client-Server Architecture → is a computing model in which server hosts, delivers and manages most of the resources and client consumes the services.

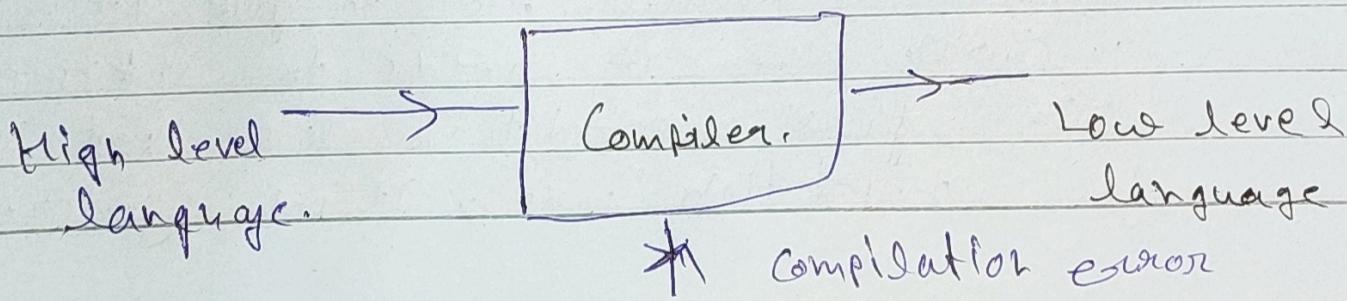
Client →

client whether it is programme or machine make a request to server.

Server → serve respond to client request. These are high performance computer are called Server as they run server programs.

Qn 39 → Answer →

Compiler → It is program that translates a source program written in some high level language into low level language for our system (computer) to understand.



Two types →

- Cross Compiler
- Source to source compiler.

~~Interpreter~~ →

Translation of code done by line by line.

Interpreting code means taking a set of instruction and returning an answer.

So when Javascript runs through interpreter ~~it~~ it reads stored file & for text or other presentation.

But when logic operation comes

It becomes very slow.

Because in looping code run line by line.

Compilers →

Compilers take the code and convert to machine code to give it C.R.O., then if needs to interpreted

So first depretat is slow but for repetition code, it is faster.

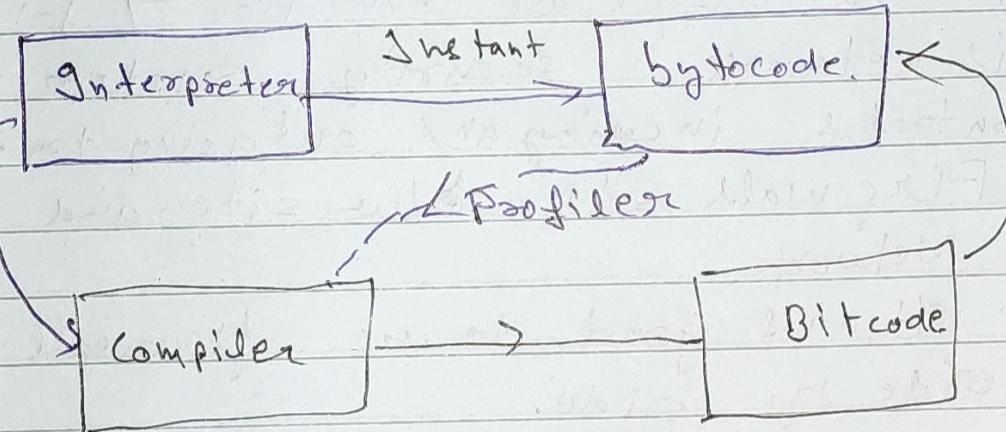
Question - 40 -

Just in time compiler →

In last question 39.

As we have seen  
when ~~we~~ ~~problems~~ we face problem  
during the use of interpreter and  
compilers. Then how browser work fast?

As browser use just in time compiler.  
that use interpreter and compilers  
simultaneously.



- 1.) First interpreter read code give instant output
- 2.) Profiler keep check on the code, if it's repeated, it gives code to compiler
- 3.) The profiler gives bit code for fast processing.

## Quesiton

### 41.) Answer →

Purpose of V.P.N → Virtual private Network  
create private network to hide  
our public interne connection.

### Q2) What VPN Do →

- 1.) It makes our system Untraceable  
and encrypt data that stops hacker  
seeing sensitive information.
- 2.) ~~It~~ Some VPN also blocks malicious  
websites, ads, and trackers.

V.P.N and Firewall Connection → Firewall  
is network security system that  
controls incoming and outgoing traffic between  
Firewall sites & our site and rest of  
Network.

It is good to use firewall and VPN  
side by side.