

DIGITAL LOGIC & DESIGN (EE-1005)

ASSIGNMENT #1

ID: 122-1899 NAME: Huzairfa Jamil SECTION: D

Read the Instructions Carefully

- ❖ Base 3, base 4, base 5, base 6 means the one you used in QUESTION 1
- ❖ Your assigned number is given to you in excel sheet provided with assignment FOR

EXAMPLE: Assigned Number if your assigned number is 7821

	Assign Digit 0	Assign Digit 1	Assign Digit 2	Assign Digit 3
Short for Assigned Digit	A0	A1	A2	A3
Write Assigned Number Digit By Digit	2	7	1	8

FOR EXAMPLE: Name is HAMAZADAUD

- ❖ Use your name instead of HAMZA
- ❖ If your name starts with MUHAMMAD kindly use your second name
- ❖ Convert repeated character to small letter or to other symbols to make them unique (see example for A, a & @)

	SIXTH CHARACTER OF YOUR NAME	FIFTH CHARACTER OF YOUR NAME	FOURTH CHARACTER OF YOUR NAME	THIRD CHARACTER OF YOUR NAME	SECOND CHARACTER OF YOUR NAME	FIRST CHARACTER OF YOUR NAME	ZERO CHARACTER OF YOUR NAME
Short for CHARACTER YOUR NAME CHARACTER BY CHARACTER	C0	C1	C2	C3	C4	C5	C6

1. Fill the table given below and Count in given base

NOTE: Use Assigned number & Your Name

- Base 3 (Zero Digit is Assign0 (A0), First Digit is Assign1 (A1), Second Digit is Assign2 (A2))
- Base 4 (Zero Digit is Assign0 (A0), First Digit is Assign1 (A1), Second Digit is Assign2 (A2), and Third Digit is Assign3 (A3))
- Base 5 (Zero Digit is Character0 (C0) of your name, First Digit is Character1 (C1) of your name, Second Digit is Character2 (C2) of your name, Third Digit is Character3 (C3) of your name, Four Digit is Character04 (C4) of your name)

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- Base 6 (Zero Digit is Character0 (C0) of your name, First Digit is Character1 (C1) of your name, Second Digit is Character2 (C2) of your name, Third Digit is Character3 (C3) of your name, Four Digit is Character04 (C4) of your name and Fifth Digit is Character05 (C5) of your name)

TABLE

BASE 10 DECIMAL	BASE 2 BINARY	BASE 3	BASE 4	BASE 5	BASE 6	BASE 8 OCTAL	BASE 16 HEXA
0	0	2	2	H	H	0	0
1	1	7	7	U	U	1	1
2	10	1	1	Z	Z	2	2
3	11	72	8	A	A	3	3
4	100	77	72	I	I	4	4
5	101	71	77	UH	F	5	5
6	110	12	71	UU	UH	6	6
7	111	17	78	UZ	UU	7	7
8	1000	11	12	UA	UZ	10	8
9	1001	722	17	UI	UA	11	9
10	1010	727	11	ZH	UI	12	A
11	1011	721	18	ZU	UF	13	B
12	1100	772	82	ZZ	ZH	14	C
13	1101	777	87	ZA	ZU	15	D
14	1110	771	81	ZI	ZZ	16	E
15	1111	712	88	AH	ZA	17	F
16	10000	717	722	AU	ZI	20	10
17	10001	711	727	AZ	ZF	21	11
18	10010	122	721	AA	AH	22	12
19	10011	127	728	AI	AU	23	13
20	10100	121	772	IH	AZ	24	14

Ans 2.1

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BASE 10	BASE 2 BINARY	BASE 3	BASE 4	BASE 5	BASE 6	BASE 8 OCTAL	BASE 16 HEXA
21	10101	172	777	IU	AA	25	15
22	10110	177	771	IZ	AI	26	16
23	10111	171	778	IA	AF	27	17
24	11000	112	712	II	IH	30	18
25	11001	117	717	UHH	IU	31	19
26	11010	111	711	UHV	IZ	32	1A
27	11011	7222	710	UHZ	IA	33	1B
28	11100	7227	782	UHA	IZ	34	1C
29	11101	7221	787	UHI	IF	35	1D
30	11110	7272	781	UHH	FH	36	1E
31	11111	7277	788	UVU	FU	37	1F
32	100000	7271	122	UVZ	FZ	40	20
33	100001	7212	127	UUA	FA	41	21
34	100010	7217	121	UVI	FI	42	22
35	100011	7211	128	UZH	FF	43	23
36	100100	7722	172	U2U	UHH	44	24
37	100101	7727	177	U2Z	UHV	45	25
38	100110	7721	171	U2A	UHZ	46	26
39	100111	7772	178	U2I	UHA	47	27
40	101000	7777	112	U4H	UHI	50	28
41	101001	7771	117	U4U	UHF	51	29
42	101010	7712	111	U4Z	UHH	52	2A
43	101011	7717	118	U4A	UVU	53	2B
44	101100	7711	182	U4I	UVZ	54	2C
45	101101	7122	187	U4H	UUA	55	2D
46	101110	7127	181	U4U	UVI	56	2E

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Assigned Number:

47	101111	7121	188	UIZ	UUF	57	2F
48	110000	7177	822	USA	UZH	60	30
49	110001	7177	827	UII	UZU	61	31
50	110010	7171	821	ZHH	UZZ	62	32

2. Perform the following conversion to check your counting in question 1

• $(22)_{10} = (?)_3$ Base 3 used in Question #1

$$\begin{array}{r|l} 3 & 22 \\ & 7-1 \\ \hline & 2-1 \end{array} \rightarrow 211$$

$$= (177)_3$$

• $(32)_{10} = (?)_4$ Base 4 used in Question #1

$$\begin{array}{r|l} 4 & 32 \\ & 8-0 \\ \hline & 2-0 \end{array} \rightarrow 200$$

$$= (122)_4$$

• $(41)_{10} = (?)_5$ Base 5 used in Question #1

$$\begin{array}{r|l} 5 & 41 \\ & 8-1 \\ \hline & 1-3 \end{array}$$

$$131$$

$$(131)_5$$

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• $(49)_{10} = (?)_6$

Base 6 used in Question # 1

6	49
6	8-1
	1-2

1 2 1
 $(UZU)_6$

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3. Convert Decimal (Assigned Number)₁₀ to (?)₃, (?)₄, (?)₅ and (?)₆ check results by recovering them to decimal
4. Convert Decimal fraction (0. Last two digits of the Assigned Number)₁₀ to (?)₃, (?)₄, (?)₅ and (?)₆ check results by reconvertting them to decimal
5. Perform addition to result of Question 3 to base in Question 1 as follow
- (Assigned number)₃ + (question 1 number 46)₃ $(721222)_3 + (7127)_3 = 723349$ Answer
 - (Assigned number)₄ + (question 1 number 49)₄ $(111371)_4 + 827 = 112656$ Answer
 - (Assigned number)₅ + (question 1 number 35)₅ $\rightarrow 1A0AA + 02H = 43133 + 120 = 42253$
 - (Assigned number)₆ + (question 1 number 24)₆ $\rightarrow 23003 + 1H = 23003 + 40 = 23043$ Answer
6. Perform subtraction to result of Question 3 from base in Question 1 as follow:
- (Assigned number)₃ - (question 1 number 46)₃ = (714015) Answer
- (Assigned number)₄ - (question 1 number 49)₄ $(111044)_4$ Answer
 - (Assigned number)₅ - (question 1 number 35)₅ $(42013)_5$ Answer
 - (Assigned number)₆ - (question 1 number 50)₆ = (22403) Answer
7. Perform R's and (R-1)'s complement to the results of question 3 to generate negative number
- R's and (R-1)'s of (Assigned number)₃ of results from Q3
 - R's and (R-1)'s of (Assigned number)₄ of results from Q3
 - R's and (R-1)'s of (Assigned number)₅ of results from Q3
 - R's and (R-1)'s of (Assigned number)₆ of results from Q3

(3)

Base 3

$$\begin{array}{r} 3 \overline{) 2718} \\ 3 \overline{) 906} - 0 \\ 5 \overline{) 302} - 0 \\ 5 \overline{) 100} - 2 \\ 3 \overline{) 33} - 1 \\ 3 \overline{) 11} - 0 \\ 3 \overline{) 3} - 2 \\ 1 - 0 \end{array}$$

$$(102000)_3 = (721222)_3$$

Verification:

$$1 \times 3^6 + 0 \times 3^5 + 1 \times 3^4 + 2 \times 3^3 + 0 \times 3^2 + 0 \times 3^1 + 0 \times 3^0 = 864$$

Base 4

$$(222312)_4$$

↓ = $(111871)_4$

For my number

$$\begin{array}{r} 4 \overline{) 2718} \\ 4 \overline{) 2718} - 0 \\ 4 \overline{) 679} - 2 \\ 4 \overline{) 169} - 3 \\ 4 \overline{) 42} - 1 \\ 4 \overline{) 10} - 2 \\ 2 - 2 \end{array}$$

Base 5

~~4333~~

$$(43133)_5$$

= 1A0AA

$$\begin{array}{r} 5 \overline{) 2718} \\ 5 \overline{) 543} - 5 \\ 5 \overline{) 103} - 3 \\ 5 \overline{) 21} - 5 \\ 5 \overline{) 4} - 1 \\ 0 - 4 \end{array}$$

Base 6

$$(23003)_6$$

= 2AHHA

$$\begin{array}{r} 6 \overline{) 2718} \\ 6 \overline{) 453} - 0 \\ 6 \overline{) 75} - 3 \\ 6 \overline{) 12} - 0 \\ 6 \overline{) 2} - 2 \\ 0 \end{array}$$

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8. Perform R-1's complement subtraction using values from Question 7 and Question 1

- (question 1 number 15)₃ - (R-1)'s of (Assigned number)₃ results from Q7
- (question 1 number 25)₄ - (R-1)'s of (Assigned number)₄ results from Q7
- (question 1 number 33)₅ - (R-1)'s of (Assigned number)₅ results from Q7
- (question 1 number 37)₆ - (R-1)'s of (Assigned number)₆ results from Q7

9. Perform R's complement subtraction using values from Question 7 and Question 1

- (question 1 number 13)₃ - (R)'s of (Assigned number)₃ results from Q7
- (question 1 number 17)₄ - (R)'s of (Assigned number)₄ results from Q7
- (question 1 number 23)₅ - (R)'s of (Assigned number)₅ results from Q7
- (question 1 number 44)₆ - (R)'s of (Assigned number)₆ results from Q7

10. Number Multiplication

- Multiply Last two digits of your assigned number (A2A3)₁₀ with (17)₁₀
- Multiply (15)₃ x (5)₃ = (?)₃ Result should be in base 3 as well
- Convert assigned Number A3 to binary and multiply with given number (A3.011)₂ with (101.011)₂

11. Number Division

- Divide First two digits of your assigned number (A0A1)₁₀ with (3)₁₀
- Convert assigned Number (A0A1)₁₀ to binary and divide in given number (A0A1)₂ with (11)₂

Q4) Base 3

$$0.18 \times 3 = 0.54$$

$$0.54 \times 3 = 1.62$$

$$0.62 \times 3 = 1.86$$

$$0.86 \times 3 = 2.58$$

$$0.58 \times 3 = 1.74$$

$$0.74 \times 3 = 2.22$$

$$0.22 \times 3 = 0.66$$

$$0.66 \times 3 = 1.98$$

$$0.98 \times 3 = 2.94$$

$$0.121202$$

Ans 2.71727

Q4 Base 4

$$0.23210$$



$$2.18172$$

Q4 Base 5

$$0.4$$

H0I

Q4 Base 6

$$0.102514$$

H.UHZFUI

(Q10) Last two digits are 18

$$(18)_{10} \times (17)_{10}$$

$$\begin{array}{r} 18 \\ 17 \\ \hline \end{array}$$

$$126 \quad (18 \times 7)$$

$$+ 18 \quad (18 \times 1) \text{ shifted one position left}$$

$$= 306 \quad (\text{Add two partial product})$$

$$= 306 \text{ Answer of (Q10)}$$

(ii) $(15)_8 \times (5)_8$

$$\begin{array}{r} 15 \\ \times 5 \\ \hline 15 \end{array}$$

(5 times 5 in base 8)

$$(771)_8 \text{ Answer}$$

(Q10

(iii) As is 8

In binary: 1000

$(1000.011)_2$ condition given

$$1000.011$$

$$< 101.011$$

$$1000.011$$

$$0000.000$$

$$1000.011$$

$$+ 100.011$$

$$101001.111001$$

Answer of (Q10iii)

(Q11):

(i) First two digits $(27)_{10} \div (3)_{10}$

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

coll

(ii) In binary $(27)_{10}$

$$= (11011)_2$$

After division there will be no remainder in result