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Roll # 20L-0921
Section:- 2E2 DLD LAB

DLD
LAB MANUAL 1

Q1) Convert the following number in base 8 and 16.

a) $(1234)_5$ first convert to decimal

$1\times5^3 + 2\times5^2 + 3\times5^1 + 4\times5^0 = (194)_{10}$

Now convert decimal to octal

8	194	
8	24	2
8	3	0
	0	3

$\therefore (302)_8$ Answer in base 8

Now convert decimal to hexadecimal

16	~~302~~ 194	
16	12	2
	0	12 → C

(12 2)

$\therefore (C2)_{16}$ Answer in base 16

b) $(187419)_{10}$

converting to octal

9 9
10 A
11 B
12 C
13 D

8	187419	
8	23427	3
8	2928	3
8	366	0
8	45	6
8	5	5
	0	5

$\therefore (550633)_8$ Answer in base 8

Converting to hexadecimal

16	187419	
16	11713	11
16	732	1
16	45	12
	2	13

2 13 12 1 11
2 D C 1 B (2DC1B)

$\therefore$ ~~(2EDIC)~~ $_{16}$ Answer in base 16

Q1 (c). $(122)_{10}$

- Converting to octal (base 8)

8	122	
8	15	2
8	1	7
	0	1

* $(172)_8$ Answer in base 8

- Converting to hexadecimal (base 16)

16	122	
16	7	10 → A
	0	7

7 10
A

* $(7A)_{16}$

Q 2) Add the following binary numbers.

a) 11 + 11
= 0110

$$\begin{array}{r} {}^{1}11 \\ +\ {}^{1}11 \\ \hline 110 \end{array}$$

b) 110 + 100
= 1010

$$\begin{array}{r} 110 \\ +\ {}^{1}100 \\ \hline 1010 \end{array}$$

c) 1010100 + 1000011
= 10010111

$$\begin{array}{r} 1010100 \\ +\ 1000011 \\ \hline 10010111 \end{array}$$

Q3) Perform the following binary subtraction.

a) 11 − 01
= 10

$$\begin{array}{r} 11 \\ -\ 01 \\ \hline 10 \end{array}$$

b) 111 − 100
= 011

$$\begin{array}{r} 111 \\ -\ 100 \\ \hline {}^{1}011 \end{array}$$

Q3 (c) $1010100 - 1000011$

$= 0010001$ (Ans)

$$\begin{array}{r} 1010100 \\ -1000011 \\ \hline 0010001 \end{array}$$

Q4, Perform the following binary multiplication

a) 11×11

~~$= 1101$~~

$= 1001$

$$\begin{array}{r} 11 \\ \times 11 \\ \hline 11 \\ 11\times \\ \hline 1001 \end{array}$$

b) $111 - 100$

$$\begin{array}{r} 111 \\ -100 \\ \hline 011 \end{array}$$

b) 101×111

$$\begin{array}{r} 101 \\ \times 111 \\ \hline 101 \\ 101\times \\ 101\times\times \\ \hline 100011 \end{array}$$

$= 100011$

Q5, Convert the following binary numbers to hexadecimal

(a) $1100\ 1010\ 0010\ 0111$

C A 5 7

$0101 = 2^3 2^2 2^1 2^0$

$1\times2^0 + 1\times2^2 = 5$

$1010 = 2^3 2^2 2^1 2^0$

$2^1 + 2^3 = 10$

$0111 = 2^3 2^2 2^1 2^0$

$= 1\times2^0 + 1\times2^1 + 1\times2^2 + 0\times2^3$

$= 7$

$1100 = 2^3 2^2 2^1 2^0$

$= 2^2 + 2^3 = 12$

$(C\ A\ 5\ 7)_{16}$ → final Answer

Q5 (b). 11 0010 1010 1001

1001
$2^3\ 2^2\ 2^1\ 2^0$

$= 1 \times 2^0 + 2^3$
$= 8 + 1 = 9$

1010
$2^3\ 2^2\ 2^1\ 2^0$

$= 2^3 + 2^1$
$= 8 + 2 = 10$ (A)

0010
$2^3\ 2^2\ 2^1\ 2^0$

$2^1 = 2$

11
$2^1\ 2^0$

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

$(3\ 2\ A\ 9)_{16}$

Q6) Determine the binary number for the following hexadecimal number.

a) $(10\ A)_{16}$

1 0 1 0

$= 1 \times 16^2 + 0 \times 16^1 + 10 \times 16^0$

$= (266)_{10} = (0100001010)_2$

2	266	
2	133	0
2	66	1
2	33	0
2	16	1
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

Q7) Convert the following hexadecimal number to decimal.

(a). $(E\ 5)_{16}$

A	10
B	11
C	12
D	13
E	14

14 5

$14\ 5$

$= 14 \times 16^1 + 5 \times 16^0$

$= (229)_{10}$

Q8) Subtract the following hexadecimal numbers.

a) $(84)_{16} - (2A)_{16}$

$$\begin{array}{r} 78^{16+}4 \\ -\ 2\ A \\ \hline 5\ 10 \end{array}$$

A → 10

14 − 10

14 → E

14 − 10 = 4

7 − 2 = 5

$= (5\ A)_{16}$

b) $(C3)_{16} - (B)_{16}$

12 → C

11 → B

$$\begin{array}{r} 11\ 12\ C\ ^{16+}3 \\ -\ \ B \\ \hline 11\ \ 8 \end{array}$$

$= (B\ 8)_{16}$

Q9) Add the following hexadecimal numbers.

a) $(4A)_{16} + (3F)_{16}$

A → 10
B → 11
C → 12
D → 13
E → 14
F → 15

$$\begin{array}{r} (1)\ 4\ A \\ +\ 3\ F \\ \hline 8\ 9 \end{array}$$

A → 10
F → 15

16 | 25
1 | 9

$= 89$ (Ans)

b) $(BF)_{16} + (AC)_{16}$

$$\begin{array}{r} (1)\ B\ F \\ +\ A\ C \\ \hline 16\ B \end{array}$$

F → 15
C → 12

15 + 12 = 27

11 + 10 = 21

16 | 27
1 | 11 → B

16 | 21
1 | 5

$= 16\ B$ (Ans)

Q10) Multiply the following hexadecimal numbers.

a) $(1F)_{16} * (C)_{16}$

A → 10
B → 11
C → 12
D → 13
E → 14
F → 15

$$\begin{array}{r} {}^{B}1\ F \\ \times\ \ C \\ \hline 17\ 4 \end{array}$$

① 15 × 12 = 180

16	180
	11 4

11 4
B 4

12 + 11 = 23

16	23
	1 7

= 174 (Ans)

b) $(2B)_{16} * (9A)_{16}$

$$\begin{array}{r} {}^{①}2\ B \\ \times 9\ A \\ \hline {}^{①}1\ A\ E \\ 1\ 3\ 7\ \times \\ \hline 1\ 8\ 7\ E \end{array}$$

=F 7E (Ans)

16	26
	1 10

11 × 10 = 110

16	20 4
	1

16	110
	6 14

6E

11	55
	3 7

Q11) Subtract the following octal numbers.

$(537)_8 - (162)_8$

$$\begin{array}{r} 4\,8\,5\,3\,7 \\ -\quad 1\,6\,2 \\ \hline 3\,7\,5 \end{array}$$

$$\begin{array}{r} {}^{1}\,4\,{}^{11}8\,{}^{1}3\,7 \\ -\quad 1\,6\,2 \\ \hline 4\,7\,5 \end{array}$$

$= 375$ (Ans)

Q12) Add the following octal numbers.

a) $(162)_8 + (537)_8$

b) $(136)_8 + (636)_8$

a)
$$\begin{array}{r} {}^{1}\,{}^{1}6\,{}^{1}2 \\ +\,5\,3\,7 \\ \hline 7\,2\,9 \end{array}$$

$= 721$ (Ans)

8 | 9 — 1 1

8 | 16 — 1 — 2

b)
$$\begin{array}{r} {}^{1}\,{}^{1}3\,{}^{1}6 \\ +\,6\,3\,6 \\ \hline 7\,7\,4 \end{array}$$

$= 774$ (Ans)

8 | 12 — 1 — 4

8 | 10 — 1 — 2

Q13) (a) $(6)_8 * (23)_8$

$$\begin{array}{r} {}^{2}\,23 \\ \times\,6 \\ \hline 1\,6\,2 \end{array}$$

$= 162$ (Ans)

8 | 18 — 2 — 2

8 | 14 — 1 — 6

(b) $(45)_8 * (44)_8$

8 | 20 — 2 — 4

8 | 10 — 1 — 2

$= 724$ (Ans)

$$\begin{array}{r} {}^{1}\,{}^{2}45 \\ \times\,44 \\ \hline 2\,6\,4 \\ 5\,6\,4\,\times \\ \hline 7\,2\,4 \end{array}$$