(2) Number system – 25 Marks

(1) convert $101101_{(binary)_2}$ to $(decimal)_{10}$

A>

$1\ 0\ 1\ 1\ 0\ 1$

$2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$

$2^0 \rightarrow 1$
$2^1 \rightarrow 0$
$2^2 \rightarrow 4$
$2^3 \rightarrow 8$
$2^4 \rightarrow 0$
$2^5 \rightarrow 32$

45

$\Rightarrow \boxed{(45)_{10}}$

(2) Convert $789_{(decimal)_{10}}$ to $(hexadecimal)_{16}$

A>

$16 \mid 789$
$16 \mid 49 - 5$
$3 - 1$

$\Rightarrow 315$

F

$\Rightarrow \boxed{(3F)_{16}}$

(3) Convert $234_{(decimal)_{10}}$ to $(octal)_8$

$8 \mid 234$
$8 \mid 29 - 2$
$3 - 5$

$\Rightarrow (352)_8$

④ Convert $1100101_{(binary)_2}$ to $(hexadecimal)_{16}$?

A>

1 1 0 0 1 0 1

$2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$

↓ ↓ ↓ ↓ ↓ ↓ ↓

64 32 0 0 4 0 1

Add

⇒ 101

16 | 101

6 – 5

⇒ $(65)_{16}$

⑤ Convert $0x1F4_{(hexadecimal)_{16}}$ to $(decimal)_{10}$?

A>

1 F 4

$16^2\ 16^1\ 16^0$

256 240 4 ⇒ 500

⇒ $(500)_{10}$

⑥ Convert $732_{(octal)_8}$ to $(binary)_2$

A>

7 3 2

↓ ↓ ↓

$8^2\ 8^1\ 8^0$

↓ ↓ ↓

64 8 1

⇒ 75

2 | 75

2 | 37 – 1

2 | 18 – 1

2 | 9 – 0

2 | 4 – 1

2 | 2 – 0

1 – 0

⇒ $(1001011)_2$

⑦ convert $10111_{(binary)_2}$ to $(decimal)_{10}$?

A)

1	0	1	1	1
↓	↓	↓	↓	↓
2^4	2^3	2^2	2^1	2^0
↓	↓	↓	↓	↓
16	0	4	2	1

$\Rightarrow 23$

$\Rightarrow \boxed{(23)_{10}}$

⑧ Convert $145_{(decimal)_{10}}$ to $(binary)_2$?

A)

2	145
2	72 – 1
2	36 – 0
2	18 – 0
2	9 – 0
2	4 – 1
2	2 – 0
	1 – 0

$\Rightarrow \boxed{(10010001)_2}$

⑨ Convert $2A3_{(hexadecimal)_{16}}$ to $(binary)_2$?

A)

10	A	3
↓	↓	↓
16^2	16^1	16^0
↓		↓
512		160	1

$\Rightarrow 673$

2	673
2	336 – 1
2	168 – 0
2	84 – 0
2	42 – 0
2	21 – 0
2	10 – 1
2	5 – 0
2	2 – 1
	1 – 0

$\Rightarrow \boxed{(1010100001)_2}$

(10) convert 65 $(decimal)_{10}$ to $(hexadecimal)_{16}$?

A) $(65)_{10} \Rightarrow 16 \overline{)65}$ (4 − 1) $\Rightarrow \boxed{(41)_{16}}$

(11) convert 345 $(octal)_8$ to $(decimal)_{10}$?

A)

3	4	5
↓	↓	↓
8^2	8^1	8^0
↓	↓	↓

$192 + 32 + 5 \Rightarrow 229$

$\Rightarrow \boxed{(229)_{10}}$

(12) convert 11101011 $(binary)_2$ to $(octal)_8$?

A)

1	1	1	0	1	0	1	1
↓	↓	↓	↓	↓	↓	↓	↓
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
↓	↓	↓	↓	↓	↓	↓	↓
128	64	32	0	8	0	2	1

$\Rightarrow 235$

$8 \overline{)235}$ (29 − 3)

$8 \overline{)29 - 3}$

3 − 5

$\Rightarrow \boxed{(353)_8}$

(13) convert 0X3EB (hexadecimal)$_{16}$ to $(binary)_2$?

A) 0 3 ← 8

16^2 16^1 16^0

768 224 8 $\Rightarrow$ 1000

$2 \overline{)1000}$ (500 − 0)

$2 \overline{)500 - 0}$ (250 − 0)

$2 \overline{)250 - 0}$ (125 − 1)

$2 \overline{)125 - 1}$ (62 − 0)

$2 \overline{)62 - 0}$ (31 − 1)

$2 \overline{)31 - 1}$

15 − 1

$2 \overline{)7 - 1}$ (3 − 1)

$2 \overline{)3 - 1}$

1 − 1

$\Rightarrow \boxed{(1111101000)_2}$

(14) convert 777 (octal)$_8$ to (hexadecimal)$_{16}$?

A)

7 7 7
↓ ↓ ↓
8^2 8^1 8^0
↓ ↓ ↓
448 56 7 ⇒ 511

16 | 511
16 | 31 - 15
31 | F

⇒ $(31F)_{16}$

(15) convert 1000001 (binary)$_2$ to (octal)$_8$?

A)

1 0 0 0 0 0 1
↓ ↓ ↓ ↓ ↓ ↓ ↓
2^6 2^5 2^4 2^3 2^2 2^1 2^0
↓ ↓ ↓ ↓ ↓ ↓ ↓
64 0 0 0 0 0 1

⇒ 8 | 65
8 | 8 - 1
1 - 0

⇒ $(101)_8$

(16) convert (5D)$_{hexadeimal}$ to decimal ?

5 D (13)
↓ ↓
16^1 16^0
↓ ↓
80 + 13 ⇒ 93

⇒ $(93)_{10}$

(17) convert 1111 (binary)$_2$ to (hexadecimal)$_{16}$?

A)

1 1 1 1
↓ ↓ ↓ ↓
2^3 2^2 2^1 2^0
↓ ↓ ↓ ↓
8 4 2 1 ⇒ 15

⇒ 16 | 15

⇒ $(F)_{16}$

(18) convert 256 (decimal)$_{10}$ to (binary)$_2$?

A)

2 5 6
↓ ↓ ↓

2 | 256
2 | 128 — 0
2 | 64 — 0
2 | 32 — 0
2 | 16 — 0
2 | 8 — 0
2 | 4 — 0
2 | 2 — 0
2 | 1 — 0

⇒ $(100000000)_2$

(19) convert 3F (hexadecimal)$_{16}$ to (binary)$_2$?

A)

15
3 F
↓ ↓
16 | 16
↓ ↓
48 240 ⇒ 290

⇒ 2 | 290
2 | 145 — 0
2 | 72 — 1
2 | 36 — 0
2 | 18 — 0
2 | 9 — 0
2 | 4 — 1
2 | 2 — 0
1 — 0

⇒ $(100100010)_2$

20) convert $0b10101110$ (binary)$_2$ to (decimal)$_{10}$?

A)

0 b 1 0 1 0 1 1 0

$2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$

64 0 16 0 4 2 0 $\Rightarrow$ 86

$\Rightarrow$ $(86)_{10}$

21) convert $0o731$ (octal)$_8$ to (binary)$_2$?

A)

0 7 3 1

$8^2\ 8^1\ 8^0$

448 | 24 | 1 $\Rightarrow$ 473

2 | 473
2 | 236 - 1
2 | 118 - 0
2 | 59 - 0
2 | 29 - 1
2 | 14 - 1
2 | 7 - 0
2 | 3 - 1
1 - 1

$\Rightarrow$ $(111011001)_2$

22) convert 0x1C (hexadical) to ~~octal~~ ?

A)

0 1 C

$16^2\ 16^1\ 16^0$

16 12 $\Rightarrow$ 28

8 | 28
3 - 4

$\Rightarrow$ $(34)_8$

(23) convert 27 (decimal)$_{10}$ to (binary)$_2$?

A)

2 | 27
2 | 13 - 1
2 | 6 - 1
2 | 3 - 0
1 - 1

$\Rightarrow$ $(11011)_2$

(24) convert 0b1010 (binary) to octal?

A) 0 0 1 0 10

2^5 2^4 2^3 2^2 2^1 2^0

0 8 0 2 0

$\Rightarrow$ 8+2 $\Rightarrow$ 10

8 | 10
1 - 2

$\Rightarrow (12)_8$

(25) convert 0057 (octal)$_8$ to decimal?

$(057)_8$

8^2 8^1 8^0

407

$\Rightarrow$ 47

$\Rightarrow (47)_{10}$

(26) convert $11111111_{(binary)_2}$ to $(hexadecimal)_{16}$?

A)

1 1 1 1 1 1 1 1

$2^7\ 2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$

128 64 32 16 8 4 2 1 $\Rightarrow$ 255

16 | 255

15 -15

F F

$\Rightarrow (FF)_{16}$

(27) convert $45_{(decimal)_{10}}$ to $(octal)_8$

A) $(45)_{10}$

8 | 45

5 - 5

$\Rightarrow (55)_8$

(28) Convert 3E (hexadecimal) to $(decimal)_{10}$?

A)

14

3 E

$16^1\ 16^0$

48 14 $\Rightarrow$ 62

$\Rightarrow (62)_{10}$

(29) convert 10101 (binary) to decimal?

1 0 1 0 1

$2^4\ 2^3\ 2^2\ 2^1\ 2^0$

16 0 4 0 1

16 + 4 + 1

21

$\Rightarrow (21)_{10}$

(30) convert 0x1A (hexadecimal) to binary?

A)

0	1	A
16^2	16^1	16^0
0	16	10

$\Rightarrow 26$

2	26
2	13 – 0
2	6 – 1
2	3 – 0
	1 – 1

$\Rightarrow (11010)_2$