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Exam : mid term
section : A
paper : DLD

Q1

A $(1011100.10101)_2 = (\ldots\ldots)_{10}$

$$\begin{array}{ccccccccccccc} 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 & & 2^{-1} & 2^{-2} & 2^{-3} & 2^{-4} & 2^{-5} \\ 1 & 0 & 1 & 1 & 1 & 0 & 0 & . & 1 & 0 & 1 & 0 & 1 \end{array}$$

$40 + 16 + 8 + 4 + 0 + 0 + . \ 0.5 + 0 + 0.125 + 0 + 0.3125$

$(92.65625)_{10}$ Ans

B $(1\,1\,1\,1\,0\,0.101)_2 = (\ldots\ldots)_{10}$

$$\begin{array}{cccccccccc} 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 & & 2^{-1} & 2^{-2} & 2^{-3} \\ 1 & 1 & 1 & 1 & 0 & 0 & . & 1 & 0 & 1 \end{array}$$

$32 + 16 + 8 + 4 + 0 + 0 \ . \ 0.5 + 0 + 0.125$

$(60.625)_{10}$ Ans

(C) $(ABCD)_{16} = (\ldots\ldots)_2$

A B C D

(1 0 1 0)(1 0 1 1)(1 1 0 0)(1 1 0 1)

$(1010101111001101)_2$ Ans

(D) $(10)_{10} = (\ldots\ldots)_{16}$

Decimal to Hexadecimal

$(10)_{10} = A_{16}$

Ans

(j) $(98)_{10}$ to $(\ldots\ldots)_{BCD}$

9 8

1001 1000

10011000

| Decimal | BCD |
|---|---|
| 0 | 0 0 0 0 |
| 1 | 0 0 0 1 |
| 2 | 0 0 1 0 |
| 3 | 0 0 1 1 |
| 4 | 0 1 0 0 |
| 5 | 0 1 0 1 |
| 6 | 0 1 1 0 |
| 7 | 0 1 1 1 |
| 8 | 1 0 0 0 |
| 9 | 1 0 0 1 |

(E) $(7777)_8 = (\ldots\ldots)_{10}$

Solution:

$(7777)_8 = (\ldots\ldots)_{10}$

Octal to Decimal

$(7\ 7\ 7\ 7)_8 = 7\times8^3 + 7\times8^2 + 7\times8^1 + 7\times8^0$

$7\times512 + 7\times64 + 7\times8 + 7\times1$

$3584 + 448 + 56 + 7$

$(4095)_{10}$ Ans.

i) $(101010)_{10}$

$\frac{101010}{8} = 12626.25 = 0.25 \times 8 = 2$

$\frac{12626}{8} = 1578.25 \Rightarrow 0.25 \times 8 = 2$

$\frac{1578}{8} = 197.25 \Rightarrow 0.25 \times 8 = 2$

$24.625 \Rightarrow 0.625 \times 8 = 5$

$\frac{24}{8} = 3$

$(35222)_8$ Ans

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F $(7777)_8 = (\text{-----})_2$

7 7 7 7

111, 111, 111, 111

$(111111111111)_2$

(H) $(10101111)_2 = (\ldots\ldots)_8$

$\overline{010}\,\overline{101}\,\overline{111}$

2 5 7

$(257)_8$

(G) $(7777)_8 = (\ldots\ldots)_{16}$

Solution:

$(7\,777)_8 = (\ldots)_{16}$

$(7777)_8 = (4095)_{10}$

$\frac{4095}{16} = 255.9375 \Rightarrow 16 \times 0.9375 = 15_F$

$\frac{255}{16} = 15.9375 = 16 \times 0.9375 = 15_F$

$\frac{15}{16} = 0.9375 \times 16 = 15_F$

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Q2

(A) $\overline{A\overline{B}(C+\overline{D})}$

let $\overline{A\overline{B}} = x$

$(C+\overline{D}) = y$

Since $\overline{xy} = \overline{x}+\overline{y}$

$\overline{A\overline{B}(C+\overline{D})} = \overline{A\overline{B}} + \overline{(C+\overline{D})}$

Since $\overline{A\overline{B}} = \overline{A}+\overline{\overline{B}}$

$\overline{A\overline{B}} + \overline{(C+\overline{D})} = \overline{A}+\overline{\overline{B}} + \overline{(C+\overline{D})}$

Since $\overline{(C+\overline{D})} = \overline{C}\,\overline{\overline{D}}$

$\overline{A}+\overline{\overline{B}} + \overline{C}\,\overline{\overline{D}}$

cancel double bars $\overline{\overline{A}} = A$

$\overline{A}+\overline{\overline{B}}+\overline{C}\,\overline{\overline{D}} = \overline{A}+B+\overline{C}D$ Ans

(B) $\overline{(A+\overline{B}+C+\overline{D})} + \overline{ABC\overline{D}}$

$\overline{A}\,\overline{\overline{B}}\,\overline{C}\,\overline{\overline{D}} + \overline{A}\,\overline{B}\,\overline{C}\,\overline{\overline{D}}$

cancel double bars $\overline{\overline{A}} = A$

$\overline{A}\,\overline{\overline{B}}\,\overline{C}\,\overline{\overline{D}} + \overline{A}\,\overline{B}\,\overline{C}\,\overline{\overline{D}} = \overline{A}B\overline{C}D + \overline{A}\overline{B}\overline{C}D$

Q3: $\bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + x\bar{y}z + \bar{x}yz + xy\bar{z}$

| Inputs x | y | z | sop expresion | output |
|---|---|---|---|---|
| 0 | 0 | 0 | $\bar{x}\bar{y}\bar{z}$ | 1 |
| 0 | 0 | 1 | | 0 |
| 0 | 1 | 0 | $\bar{x}y\bar{z}$ | 1 |
| 0 | 1 | 1 | $\bar{x}yz$ | 1 |
| 1 | 0 | 0 | | 0 |
| 1 | 0 | 1 | $x\bar{y}z$ | 1 |
| 1 | 1 | 0 | $xy\bar{z}$ | 1 |
| 1 | 1 | 1 | | 0 |

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Q3

## Part (B)

| A | B | C | D | expression | output |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | $\bar{A}\bar{B}\bar{C}\bar{D}$ | 1 |
| 0 | 0 | 0 | 1 | | 0 |
| 0 | 0 | 1 | 0 | $\bar{A}\bar{B}C\bar{D}$ | 1 |
| 0 | 0 | 1 | 1 | $\bar{A}\bar{B}CD$ | 1 |
| 0 | 1 | 0 | 0 | | 0 |
| 0 | 1 | 0 | 1 | | 0 |
| 0 | 1 | 1 | 0 | | 0 |
| 0 | 1 | 1 | 1 | | 0 |
| 1 | 0 | 0 | 0 | | 0 |
| 1 | 0 | 0 | 1 | | 0 |
| 1 | 0 | 1 | 0 | | 0 |
| 1 | 0 | 1 | 1 | | 0 |
| 1 | 1 | 0 | 0 | $AB\bar{C}\bar{D}$ | 1 |
| 1 | 1 | 0 | 1 | | 0 |
| 1 | 1 | 1 | 0 | | 0 |
| 1 | 1 | 1 | 1 | | 0 |

Q 4:

(A): $BC + DE(B\bar{C} + DE)$

Solution: As given

$BC + DE(B\bar{C} + DE)$

$BC + B\bar{C}DE + DDEE$

By Rule No. 7 $AA = A$

$= BC + B\bar{C}DE + DE$

Q 4. (B) $BC(\bar{C}\bar{D} + CE)$

As given

$BC(\bar{C}\bar{D} + CE)$

$BC\bar{C}\bar{D} + BCCE$

By Rule BCCE

By Rule No. 8

$A \cdot \bar{A} = 0$

$B0\bar{D} + BCCE$

Q4 = (C)

$B + C[BD + (C + \bar{D})E]$

$= B + C[BD + CE + \bar{D}E]$

$= B + CBD + CCE + C\bar{D}E$

= By Rule No. 7

$A \cdot A = A$

$= B + CBD + CE + C\bar{D}E$