Fall Semester 2020-2021

Continuous Assesment test - II

Subject : Fundamental of Electrical and Electronics Engineering (EEE 1024)

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1)

a) $F \Rightarrow AB + \overline{BC}$

b)

A	B	C	$\overline{B}$	$\overline{C}$	$\overline{BC}$	AB	$F \Rightarrow AB + \overline{B}\overline{C}$
0	0	0	1	1	1	0	1
0	0	1	1	0	0	0	0
0	1	0	0	1	0	0	0
0	1	1	0	0	0	0	0
1	0	0	1	1	1	0	1
1	0	1	1	0	0	0	0
1	1	0	0	1	0	1	1
1	1	1	0	0	0	1	1

2) a) $f \Rightarrow 300Hz$

$\omega \Rightarrow 2\pi f$

$\Rightarrow 2 * 300\pi$

$\omega \Rightarrow 600\pi$

$V_m \cos(600\pi t + \theta)$

$V_1 \Rightarrow 15 \cos(600\pi t - 30^\circ)$

$V_2 \Rightarrow 10 \cos(600\pi t + 30^\circ)$

$V_3 \Rightarrow 20 \cos(600\pi t + 90^\circ)$

b) $V_s(t) \Rightarrow V_2(t) + V_3(t)$

$V_s(t) \Rightarrow \left(10 \cos(600\pi t + 30^\circ)\right) + \left(20 \cos(600\pi t + 90^\circ)\right)$

$\Rightarrow 10 \angle 30^\circ + 20 \angle 90^\circ$

$\Rightarrow 10\left[\cos(30^\circ) + i \sin(30^\circ)\right] + 20\left[\cos(90^\circ) + i \sin(90^\circ)\right]$

$\Rightarrow 10\left[\sqrt{3}/2 + i\,(1/2)\right] + 20\left[0 + i\,(1)\right]$

$\Rightarrow 10\left[0.8660 + i\,(0.5)\right] + 20[i]$

$\Rightarrow 8.660 + 5i + 20i$

$V_s(t) \Rightarrow 8.660 + 25i$

$$\Rightarrow \sqrt{(8.660)^2 + (25)^2} \quad \tan^{-1}\left(\frac{25}{8.660}\right)$$

$$\Rightarrow \sqrt{74.9956 + 625} \quad \tan^{-1}(2.8868)$$

$$\Rightarrow 26.457 \tan^{-1}(2.8868)$$

$$\Rightarrow 26.457 \angle 70^\circ$$

$V_s(t) \Rightarrow 26.457 \angle 70^\circ$

$\Rightarrow 26.457 [\cos(70^\circ) + i \sin(70^\circ)]$

$V_{cot} \Rightarrow 26.457 \cos(600\pi t + 70^\circ)$

4)

Mesh-1

$I_1 5 - 25j(I_1 - I_2) = 60 \angle 30^\circ$

$60 \angle 30^\circ \Rightarrow 60[\cos(30^\circ) + i \sin(30^\circ)]$

$\Rightarrow 60\left[\sqrt{3}/2 + i(1/2)\right]$

$5I_1 - 25j(I_1 - I_2) \Rightarrow 30\sqrt{3} + 30i \rightarrow (1)$

$\Rightarrow 30\sqrt{3} + 30i$

Mesh-2

$-(I_2 - I_1)\,25j - I_2 15j + 10 \angle 180^\circ \Rightarrow 0$

$-25j\,(I_2 - I_1) - 15j\,I_2 - 10 \Rightarrow 0$

$10\angle 180^\circ \Rightarrow 10\left(\cos(180^\circ) + i\sin(180^\circ)\right)$

$-25j\,(I_2 - I_1) - 15j\,I_2 \Rightarrow 10 \longrightarrow (2)$

$\Rightarrow 10\,[-1 + 0]$

$\Rightarrow -10$

Solve ① & ②

$5I_1 - 25j\,I_1 + 25j\,I_2 \Rightarrow 30\sqrt{3} + 30i$

$I_1\,(5 - 25j) + I_2\,(25j) \Rightarrow 30\sqrt{3} + 30i$

$-25j\,I_2 + 25j\,I_1 - 15j\,I_2 \Rightarrow 10$

$I_1\,(25j) + I_2\,(-25j - 15j) \Rightarrow 10$

$I_1\,(25j) + I_2\,(-40j) \Rightarrow 10$

Finally $\quad I_1\,(5 - 25j) + I_2\,(25j) \Rightarrow (51.961 + 30i)$

$I_1\,(25j) + I_2\,(40j) \Rightarrow 10$

Matrix form

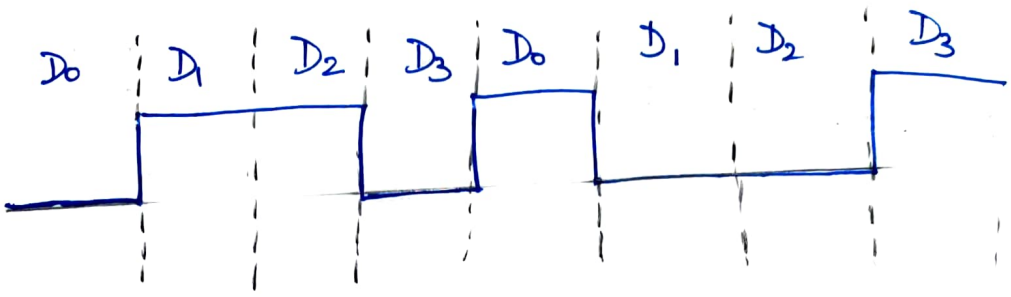
$$\begin{bmatrix} 5 - 25j & 25j \\ 25j & -40j \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 51.961 + 30i \\ 10 \end{bmatrix}$$

$I_1 \Rightarrow 0.0869 + j(6.1629)$

$I_2 \Rightarrow 0.0543 + j\,(4.1018)$

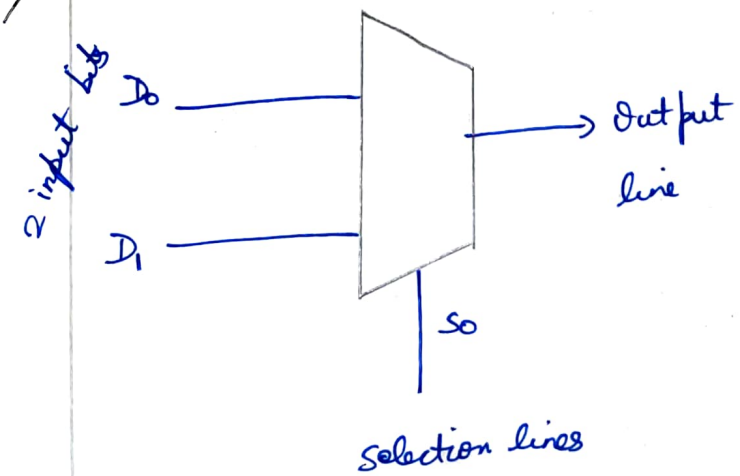
5)

b)



a)

2:1 Multiplexer



* The selection line will select among the 2 input bits which will go the output.
* When S0 is 0, the output is D0
* When S0 is 1, the output is D1

3)

a) 873.32_{10} to binary

2	873	
2	436	1
2	218	0
2	109	0
2	54	1
2	27	0
2	13	1
2	6	1
2	3	0
	1	1

$.32 * 2 \Rightarrow 0 + 0.64$

$0.64 * 2 \Rightarrow 1 + 0.28$

$0.28 * 2 \Rightarrow 0 + 0.56$

$0.56 * 2 \Rightarrow 1 + 0.12$

$0.12 * 2 \Rightarrow 0 + 0.24$

$\therefore 873.32_{10} \Rightarrow (1011\,01001 \cdot 01010)_2$

b) $A91.2_{16}$

A 9 1 . 2

1010 1001 0001 0010

2	9	
2	4	1
2	2	0
	1	0

2	10	
2	5	0
2	2	1
	1	0

$A91.2_{16} \Rightarrow (1010\ \ 1001\ \ 0001 \cdot 0010)_2$