Electrical Engineering Department
Faculty of Engineering & Technology
University of Jordan

الاسم: .....

Reg. No.: .0119203.. **Sec.:** ...1:00-2:00 / د. غازي ...

Instructor:	Dr. Othman Al Smadi	Dr. Ghazi Al Sukkar ☑	Eng. Hasan Farahneh ☐

Lecture Time:	Sun, Tues, Thur ☑ 1:00 - 2:00	Mon, Wed ☐ .....

Electrical Circuits (2) (EE212)
Second Exam
2nd Term, 2012-2013
April 22nd, 2013. ⌛ 16:00 – 17:30

Notes:

- Write your name and section on all pages
- Do not write on the back of this page.

Otherwise you will lose 5 marks out of 30.

Problem No.	Marks Awarded
Q1 (10)	1.5
Q2 (10)	7
Q3 (10)	8
TOTAL (30)	16.5

Section:..... الاسم:.....

Q(1): In Fig.1 below, the three phase source is balanced, P_1 reads upscale 4411 Watt, while P_2 reads downscale 1000 Watt, and $\boldsymbol{V_{AB}} = 440\angle 0°$V rms. Determine:

1) (2 marks) The value of P.F. for the load (is it lagging or leading?)
2) (4 marks) $\boldsymbol{I_{aA}}$ and $\boldsymbol{Z_p}$
3) (2 marks) $\boldsymbol{V_{an}}$
4) (2 marks) The P.F. at the Source (is it lagging or leading?) and the total complex power of the source.

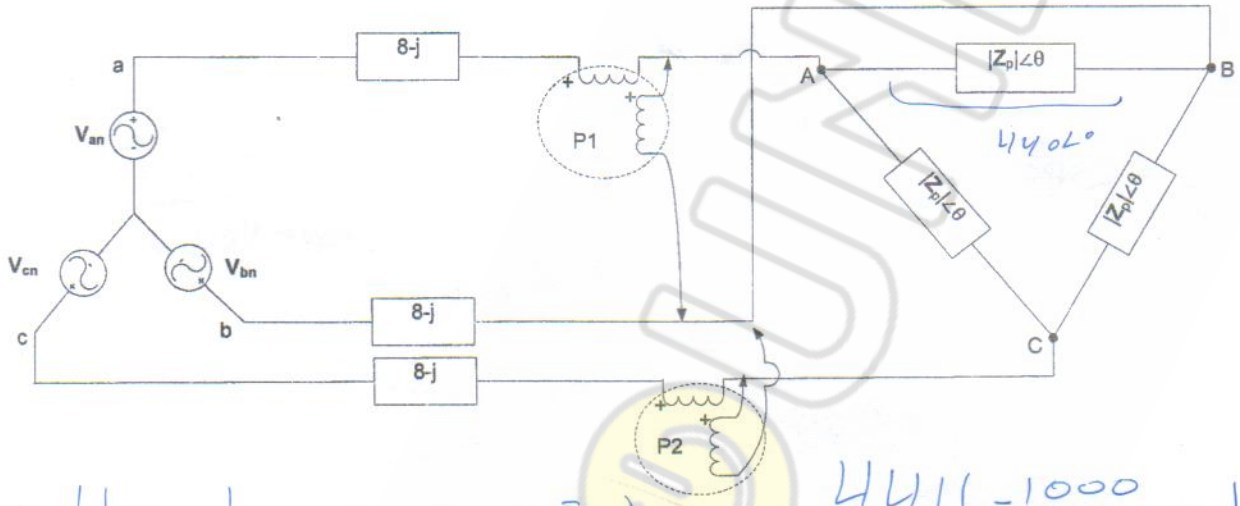

Fig. 1

$|V_{AB}||I_{AB}|\cos(\text{ang}V_{AB} - \text{ang}I_{AB}) = \frac{4411 - 1000}{3} = 1137$

$|440||I_{AB}|\,P.F = 1137$

$|V_{AB}||I_{aA}| = 4411$

$\cos(\text{ang}V_{AB} - \text{ang}I_{aA})$

$|V_{AB}||I_{AB}\sqrt{3}|\cos = 4411$

$\cos(+(+90+\theta))$

$440\, I_{AB}\sqrt{3}\cos(90+\theta) = 4411$

$440\, I_{AB}\cos\theta = 1137$

$\sqrt{3}\,\frac{\cos(90+\theta)}{\cos(+\theta)} = 3.86$

$\frac{\cos(90+\theta)}{\cos(+\theta)} = 2.23$

$\frac{\sin+\theta}{\cos+\theta} = 2.23$

$+\theta = 65.847$

$\theta = \pm 65.84°$

$P.F. = 0.409$ Lagging

$I_{aA} = \sqrt{3}\angle -30$

$|I_{aA}| = I_{AB}\sqrt{3}$

Section: 1:00-2:00 ثلاثاء ..... الاسم: معاذ أحمد محمد

Q(2): (a) (6 marks) For the circuit shown in Fig.2 find: V_2 and I_x.

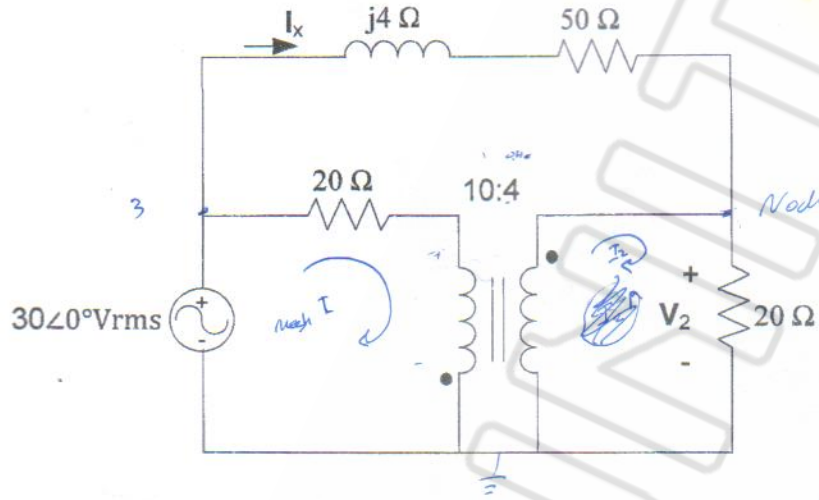

Fig. 2

a = -0.4

$\frac{V_2}{V_1} = -0.4$

$V_1 = \frac{V_2}{-0.4}$

$\frac{I_1}{I_2} = -0.4$

(a) Node I

V_2

(a) mesh I

$-30\angle 0 + 20I_1 - \frac{V_2}{0.4} = 0$

$+30\angle 0 = 20I_1 - \frac{V_2}{0.4}$

$30\angle 0 = 20I_1 - \frac{V_2}{0.4}$ -(1)

(a) Node I

$\frac{V_2}{20} = I_2 + I_x$

$\frac{30 - V_2}{j4+50} = I_x$ -(x)

$\frac{V_2}{20} = -\frac{I_1}{0.4} + \frac{30 - V_2}{j4+50}$

$\frac{V_2}{20} - \frac{30 + V_2}{j4+50} = -\frac{I_1}{0.4}$

$\frac{(j4+50)V_2 - 60 - 20V_2}{20(j4+50)} = -\frac{I_1}{0.4}$

$\frac{V_2((j4+50) - 20) - 60}{20(j4+50)} = -\frac{I_1}{0.4}$ -(2)

$V_2 = 0.93\angle -94.7$ V

$I_1 = 2.3\angle -1.8$ A

$= 5.75\angle 178.2$

$I_2 = -\frac{I_1}{0.4} =$

$I_x = \frac{V_2}{20} - I_2$

$I_x = 5.865\angle -1.8$ A

Section: 1:00-2:00 الاسم:

(b) (4 marks) For the circuit shown in Fig.3 given $v_s(t) = 20\cos 10t\ V$, find $v(t)$.

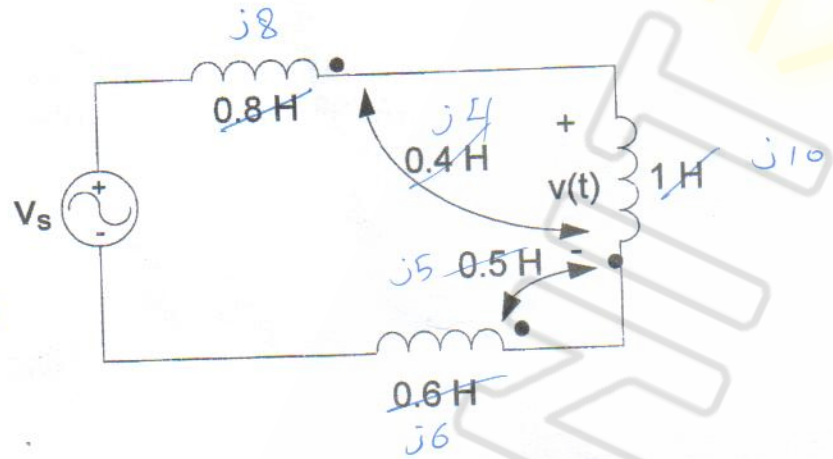

Fig. 3

$$-V_s + j8I_1 + j4I_1 + j10I_1 + j4I_1 - j5I + j6I_1 - j5I_1 = 0$$

$$-20\angle 0^\circ + (j8 + j4 + j10 + j4 - j5 - j5 + j6)\, I_1 = 0$$

$$I_1 = \frac{20\angle 0^\circ}{j22} = 0.909\angle -90\ A$$

$$\vec{V} = j10I_1 + j4I_1 - j5I_1$$

$$= (j10 + j4 - j5)\, 0.909\angle -90$$

$$= 8.1818\angle 0^\circ$$

$$v(t) = 8.1818\cos 10t \quad Volt$$

4

Section: 1:00-2:00 الاسم:

Q(3): In the circuit shown in Fig.4, given $v_s(t) = 10e^{-2t}\cos(10t + 30^o)\bar{V}$, determine:

1- (6 marks) $i_1(t)$
2- (2 marks) The natural response for $\boldsymbol{I_2(s)}$ in the s-domain.
3- (2 marks) Constellate all poles/zeros for $\boldsymbol{I_2}$.

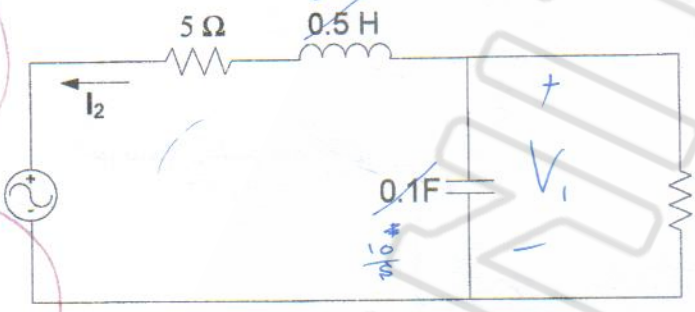

Fig. 4

Good Luck