بسم الله الرحمن الرحيم

**King Fahd University of Petroleum and Minerals**

**Department of Electrical Engineering**
**EE 204 Fundamentals of Electric Circuits,**
**Second Semester (102)**

**Final Exam**
**Sunday, 12 June 2011**
**7:30 am – 10:00 am (150 minutes)**

**Name:** _____

**ID:** _____

**Section:** _____

| Instructors | Sections |
|---|---|
| Dr. Ahmad Yamani | 1, 4, 6 |
| Dr. Qureshi | 2 |
| Dr. Hammi | 3 |
| Dr. Adel Balghonaim | 5 |
| Mr. Noman Tasaduq | 7 |
| Dr. Wajih Abul Al-Saud | 8, 10 |
| Dr. Abdulmalik Zidouri | 9, 11 |

| Prob. | Score | Out of |
|---|---|---|
| 1 | | 5 |
| 2 | | 5 |

| Prob. | Score | Out of |
|---|---|---|
| 3 | | 9 |
| 4 | | 9 |

| Prob. | Score | Out of |
|---|---|---|
| 5 | | 9 |
| 6 | | 9 |

| Prob. | Score | Out of |
|---|---|---|
| 7 | | 8 |
| 8 | | 10 |

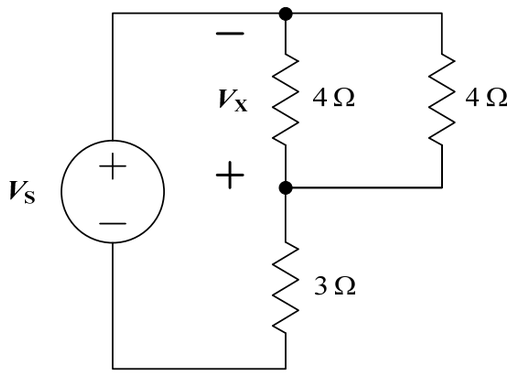
| Prob. | Score | Out of |
|---|---|---|
| 9 | | 8 |
| 10 | | 10 |

| Prob. | Score | Out of |
|---|---|---|
| 11 | | 6 |
| 12 | | 12 |

| Total | | 100 |
|---|---|---|

**Good luck!**

**(1) Using voltage division in the circuit below, we find that $V_X$ is equal to:**




(A) $V_X = V_S \times \frac{4}{7}$

(B) $V_X = -V_S \times \frac{4}{7}$

(C) $V_X = -V_S \times \frac{2}{5}$

(D) $V_X = -V_S \times \frac{2}{7}$

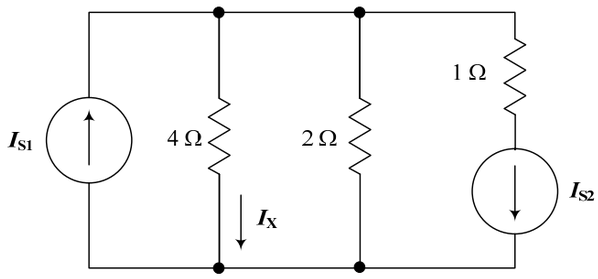
(E) $V_X = -V_S \times \frac{4}{10}$

(F) $V_X = V_S \times \frac{2}{5}$

(G) Non of the above

**The correct answer is (  )**

**(2) Using current division in the circuit below, we find that $I_X$ is equal to:**




(A) $I_X = (I_{S1} - I_{S2}) \times \frac{3}{7}$

(B) $I_X = (I_{S1} - I_{S2}) \times \frac{2}{6}$

(C) $I_X = (I_{S1} - I_{S2}) \times \frac{2}{7}$

(D) $I_X = (I_{S1}) \times \frac{2}{7}$

(E) $I_X = (I_{S2} - I_{S1}) \times \frac{2}{6}$

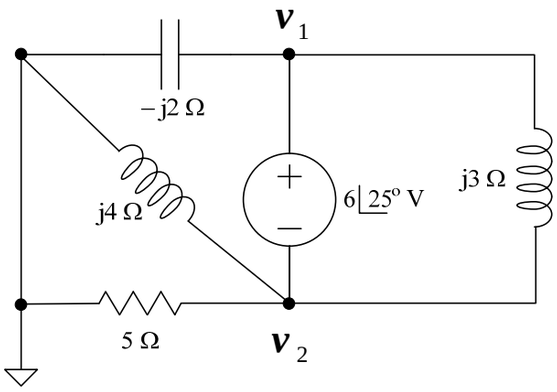
(F) $I_X = (I_{S2} - I_{S1}) \times \frac{4}{6}$

(G) Non of the above

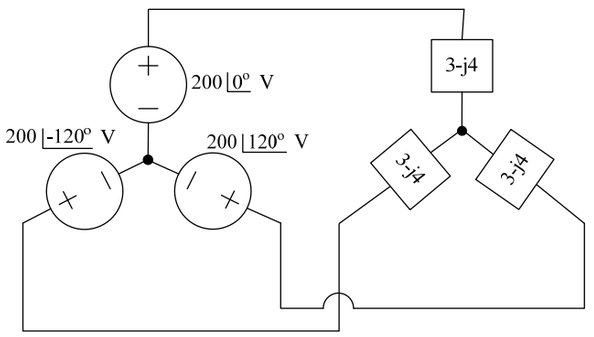
**The correct answer is (  )**

**(3) Write all NODE-VOLTAGE equations necessary to solve for the node voltage in the circuit.**

- **Your equations should be in terms of the node voltages only.**
- **Do not simplify or solve the equations.**
- **You will loose marks for missing or extra equations.**

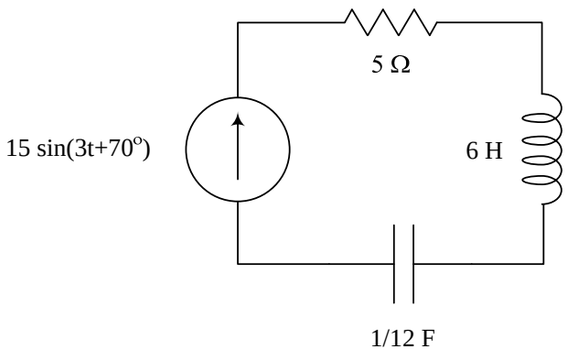



**(4) For the BALANCED 3-phase system shown below, find the total <u>average power</u> $P_{3\text{-phase}}$ consumed in the 3-phase load (The voltages of the source are RMS values).**



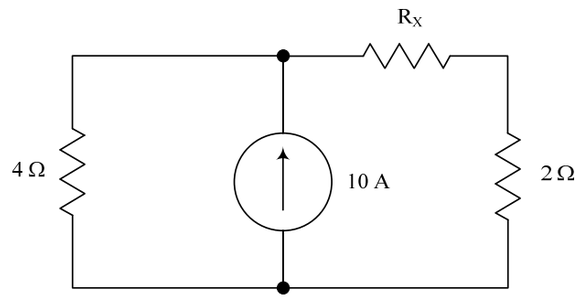

| $P_{3\text{-phase Load}}$ = | W |
|---|---|

**(5) Find the <u>complex power</u> of the source $\hat{P}_{source}$ .**



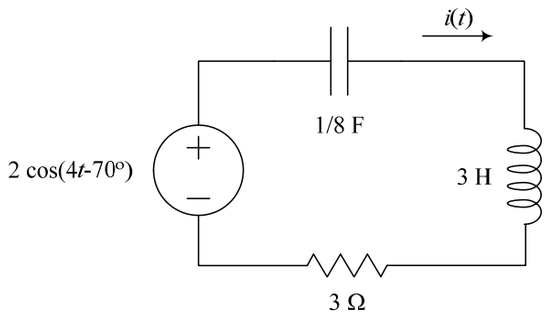

$\hat{P}_{source}$ = VA

**(6) The current source generates 300 W of power. Find the power delivered to the resistor $R_X$.**



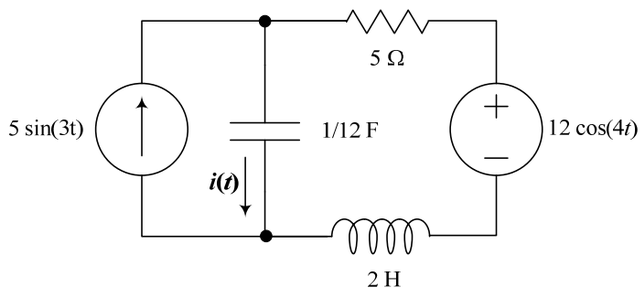

$P_{R_X}$ = W

**(7) Find the current $i(t)$ shown in the circuit below.**



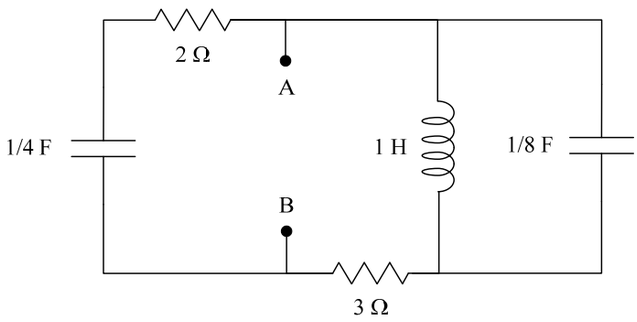

$i(t)$ = A

**(8) In the following circuit, find the current $i(t)$.**



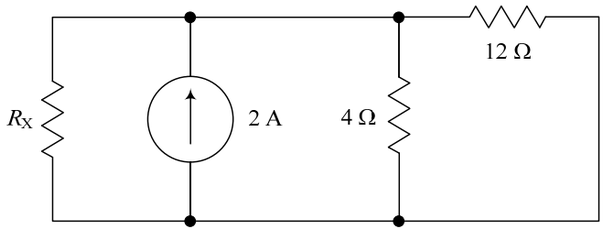

$i(t)$ =

**(9) Given that the circuit below operates at a frequency ω = 4 rad/s, find the equivalent impedance *Z* seen between points A and B.**



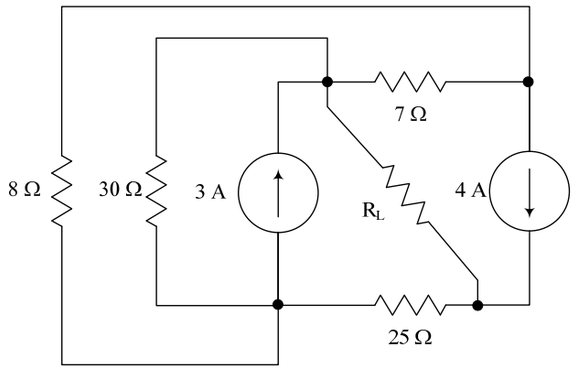

***Z* =**

**(10) Find ALL values of resistance $R_x$ that will make the power consumed by it to be equal to 1 W.**



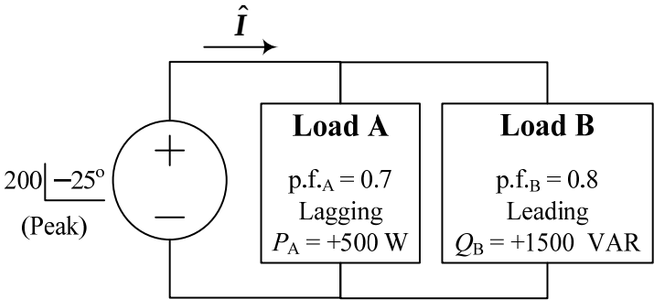

**Values of $R_X$ are** **Ω**

**(11) Find $R_L$ that will absorb the maximum power from the circuit (DO NOT find the maximum power).**




$R_L$ = Ω

**(12) Load A and Load B are connected in parallel across a voltage source $200\angle -35°$ V (peak). Load A has a leading power factor (p.f.) of 0.7 with real power of +500 W. Load B has a lagging p.f. of 0.8 with reactive power +1500 VAR. Determine the current $\hat{I}$.**




$\hat{I}$ = A