國立臺北科技大學 101 學年度碩士班招生考試

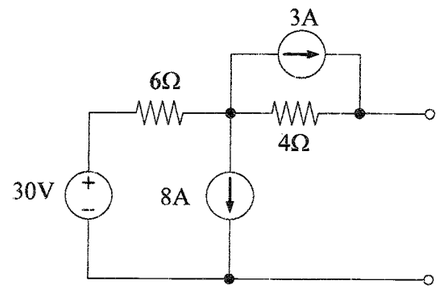
系所組別：1523 自動化科技研究所乙組

第二節　電路學　試題（選考）

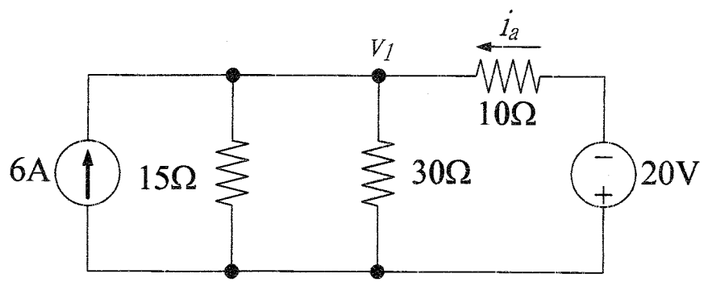
注意事項：

1. 本試題共六題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. For the circuit shown below, find the Thévenin equivalent circuit. (20%)

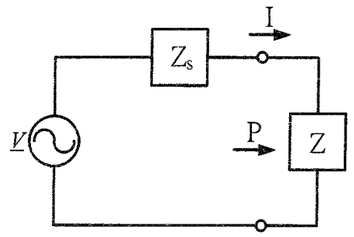


2. Find the values of v_1 and i_a in the circuit shown below. (20%)

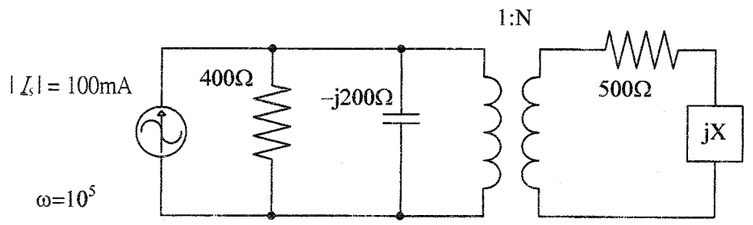


3. Evaluate the impedance and admittance of a 25 mH inductor when ω=800 rad/s. Also find the voltage, v(t), at the two terminals of the inductor when the current through the inductor is given as i(t)=4 cos(800t – 50°). (20%)

4. For the circuit shown below, the impedance of the AC voltage source is $Z_s=R_s+jX_s$. The impedance of the load is Z=R+jX. The frequency of the AC source is ω rad/s. Express the real power P in terms of the fixed RMS source voltage, V, and impedances of the voltage source and the load. (10%)



5. The circuit shown below is the frequency domain model for the output of an amplifier operating at $\omega=10^5$. The load has a fixed resistance of 500 Ω. Identify the load reactance X and the transformer's turn ratio N to achieve the maximum power transfer. Assume that the transformer is an ideal transformer. (20%)



6. For the circuit shown below, calculate the power factor. (10%)