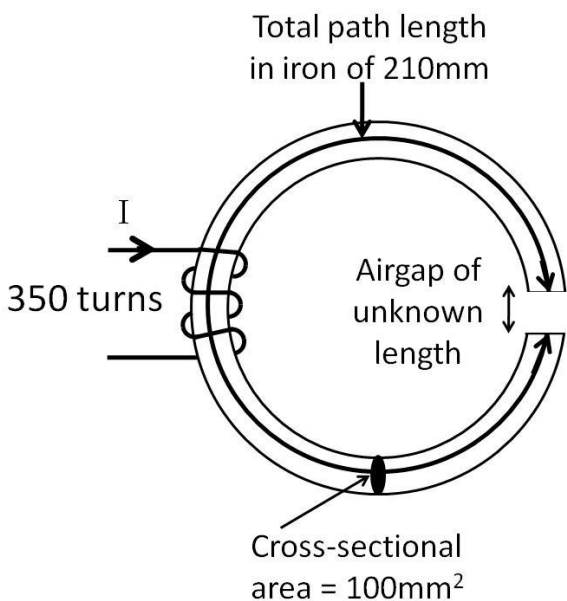
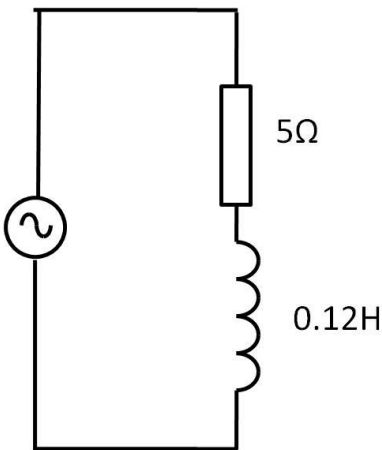


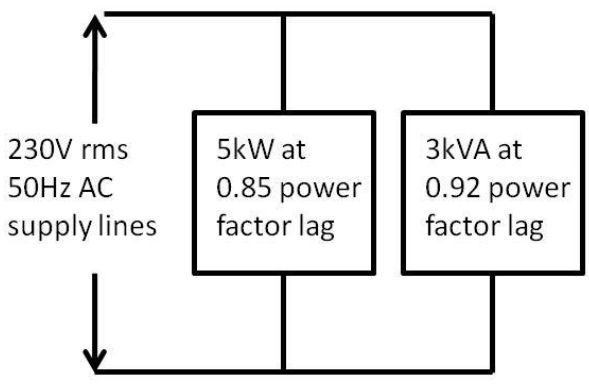
Registration number:

## EEE102 Power Networks Mid Term Test – March 2010

Constants required:  $\mu_0 = 4\pi \times 10^{-7} \text{ Hm}^{-1}$

	Question	Answer	Marks
<b>1</b>	i) Convert the impedance $0.6 + j1.9\Omega$ into a magnitude and phase representation:	i)	[1]
	ii) Convert the impedance $9.6 \angle 60^\circ \Omega$ into a cartesian complex representation	ii)	[1]
<b>2</b>	<p>A 350 turn coil is wound onto the circular iron core shown below. The iron core has a fixed relative permeability of 300 and includes a small airgap as shown. The total length of the flux path within the iron core is 210mm. When a current of 9.5A flows in the coil, the flux density in the core is 1.4T. Calculate the length of the airgap which results in these conditions and hence calculate the inductance of the coil</p>  <p style="text-align: center;">Total path length in iron of 210mm</p> <p style="text-align: center;">Airgap of unknown length</p> <p style="text-align: center;">Cross-sectional area = <math>100\text{mm}^2</math></p>	<p>Include any intermediate calculations in this box and state answer at bottom of box</p> <p>Airgap length:</p> <p>Inductance:</p>	<p>[6]</p> <p>[2]</p>

3	<p>Calculate the impedance of the circuit below; the magnitude and phase of the current drawn from the supply; the VA, VAR, and the real power supplied to the load; and finally the peak energy stored in the inductor</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: right; padding-right: 10px;"> 230V rms 50Hz AC sinusoidal supply </div>  </div>	Impedance:	[1]
		Current:	[1]
		VA:	[1]
		VAR:	[1]
		Real power:	[1]
		Peak energy stored in the inductor:	[1]

4	<p>Calculate the total Watts, VA and VAr drawn by the combination of loads shown below and hence calculate the current drawn from the supply</p>	<p>Show all your intermediate calculations in the box and state the final answers at the bottom of the box</p>	
	 <p>230V rms 50Hz AC supply lines</p> <p>5kW at 0.85 power factor lag</p> <p>3kVA at 0.92 power factor lag</p>	<p>Watts:</p> <p>VA:</p> <p>VAr:</p> <p>Current drawn from supply:</p>	<p>[5]</p>

END OF QUESTION PAPER