UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA *ENGINEERING : COMPUTER SYSTEMS* *ENGINEERING : ELECTRICAL*
SUBJECT	:	**ELECTRICAL ENGINEERING 1** **ELECTROTECHNOLOGY 1**
CODE	:	**AEI1221 / ELT1111**
DATE	:	WINTER EXAMINATION 2014 19 JUNE 2013
DURATION	:	(SESSION 2) 12:30 - 15:30
WEIGHT	:	40 : 60
TOTAL MARKS	:	101

ASSESSOR	:	MR PR WILSON
MODERATOR	:	DR DE JAGER
NUMBER OF PAGES	:	5 PAGES

2014

INSTRUCTIONS

1. ANSWER ALL QUESTIONS
2. 1 MARK = 1%
3. CALCULATORS ARE PERMITTED

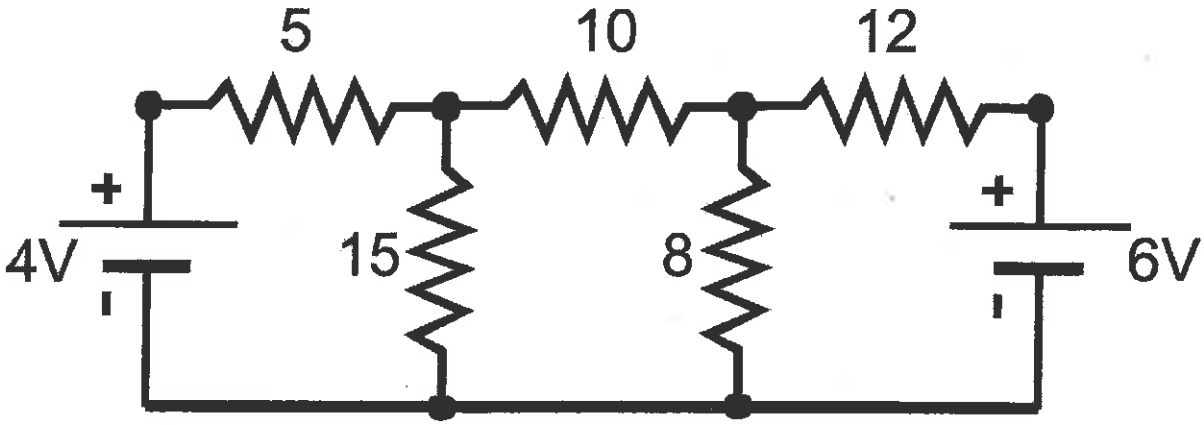
QUESTION 1

An electric geyser is required to heat 150 litres of water from 22°C to 60°C. The geyser has a 2kw element and an overall efficiency of 85%. If the cost of electricity is R1.15 per kwh determine the cost involved and the time taken to heat the water. Note. The specific heat capacity of water is 4190 J/kg

[8]

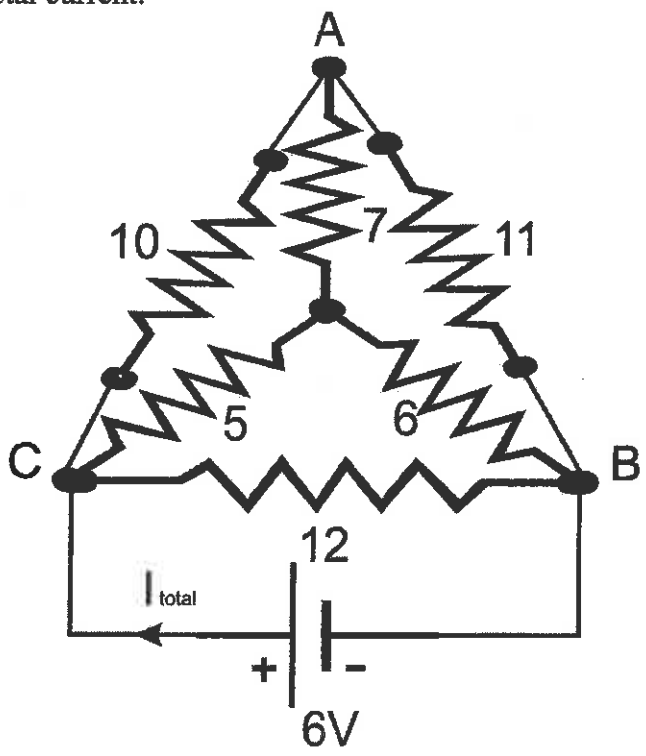
QUESTION 2

2.1 Using the superposition theorem determine the current through the 8Ω resisitor.



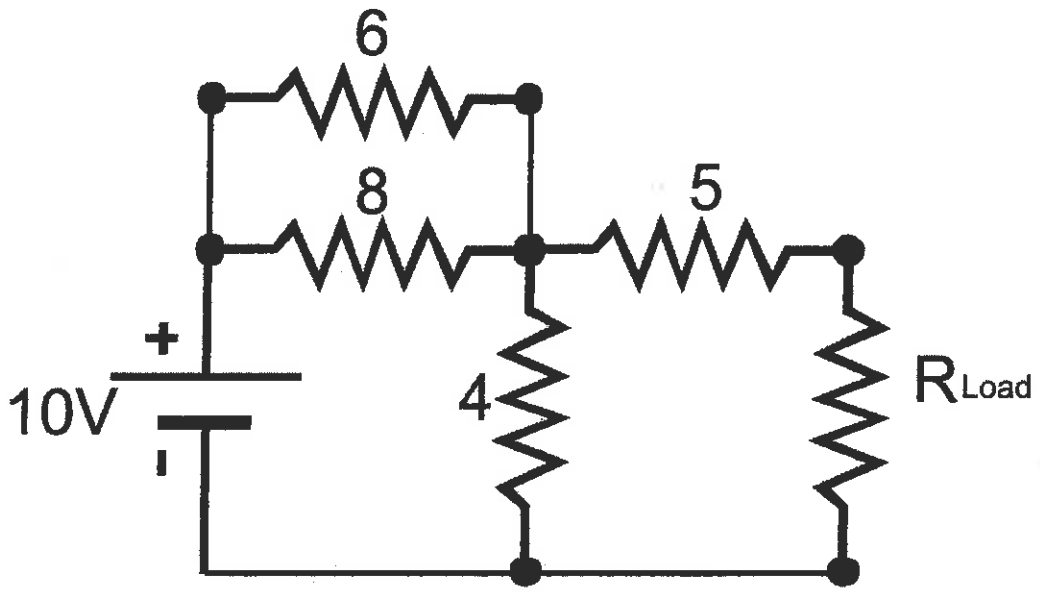
(17)

2.2 By conducting a Star to Delta transformation on Star ABC calculate the total current.



(11)

2.3 Determine the Thevenin and Norton equivalent of the circuit below.

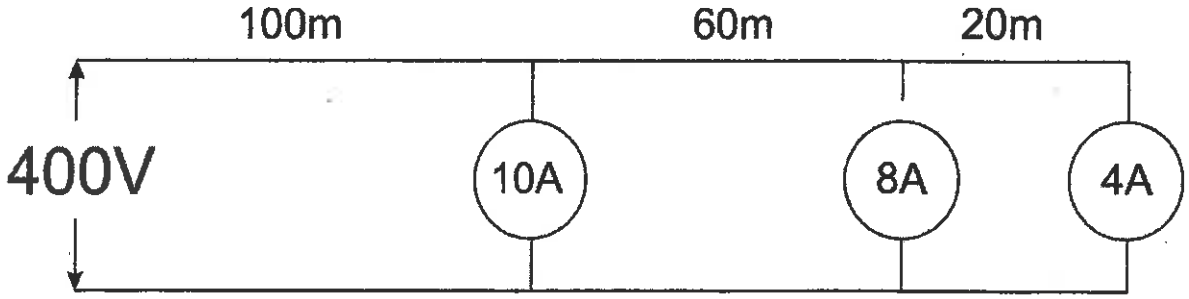


(10)

[38]

QUESTION 3

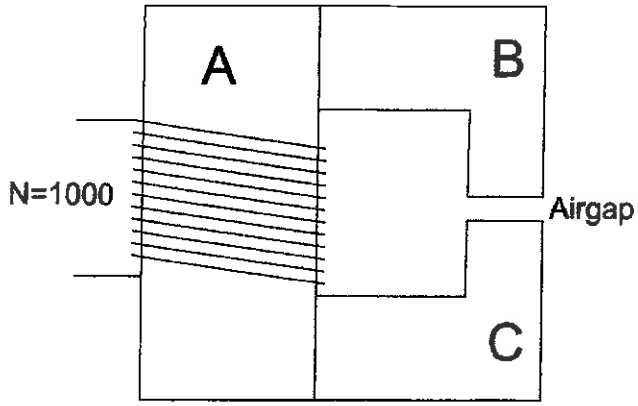
Calculate the efficiency of the D.C. distribution system if the copper has a diameter of 1.25mm and ρ of 0.017μΩm.



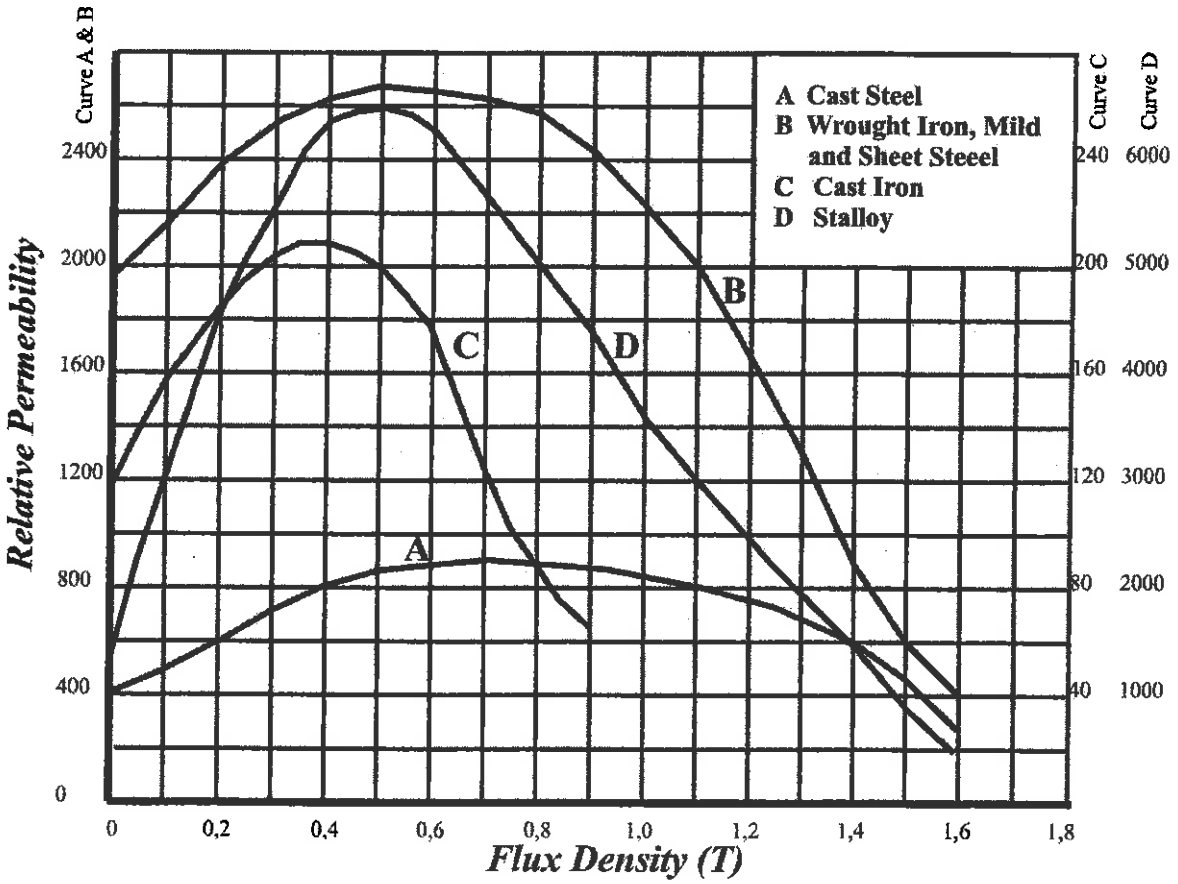
[16]

QUESTION 4

Calculate the current required to setup a flux density of 0.8 Tesla in the airgap.



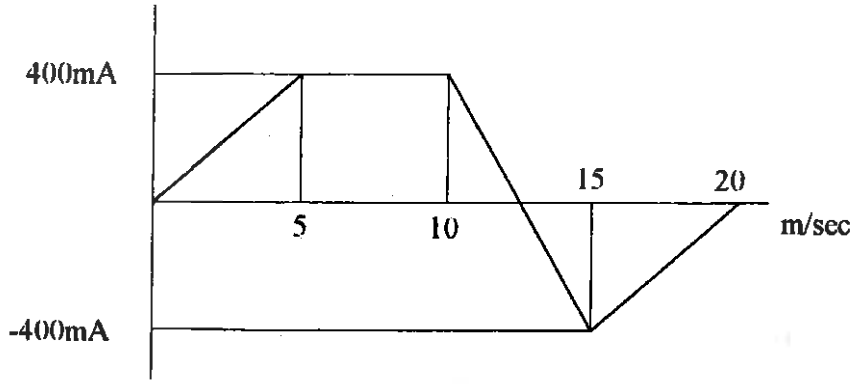
Section	Length	Area	Material
A	100mm	80mm^2	Cast Steel
B	50mm	40mm^2	Stalloy
C	50mm	40mm^2	Stalloy
Airgap	1mm	40mm^2	



[16]

QUESTION 5

A coil of 1000 turns is wound on a wooden torroidal former. The mean sectional area and length of the magnetic circuit is 20cm^2 and 100mm respectively. The current in the inductor is has the wave form as shown below. Determine and plot the graph of the induced voltage.

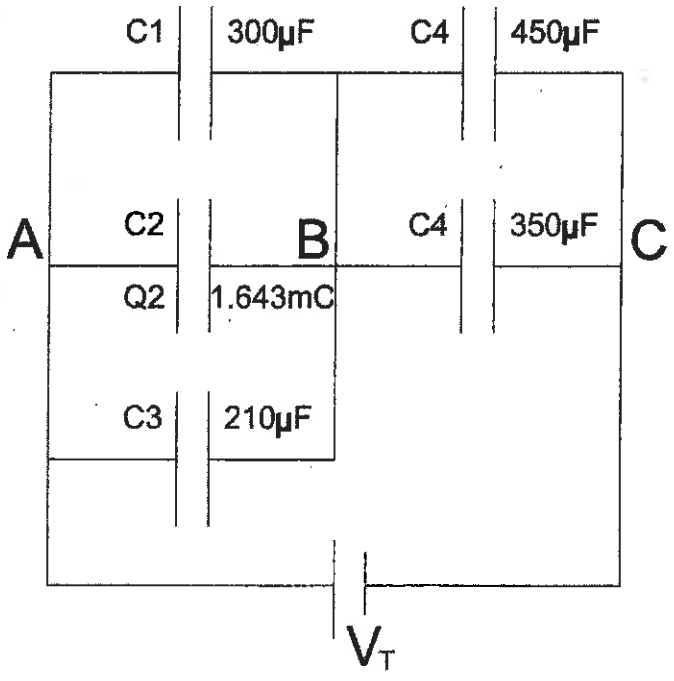


[12]

QUESTION 6

If V_{AB} = 10.96V determine the following:

6.1 The capacitance of the parallel section AB.
6.2 The voltage V_{BC}.
6.3 The energy stored in the circuit.



[10]

Total 100 marks