

Write PART A, B & C in separate answer sheets
Answer all questions

PART A

1. Consider the circuit shown in Figure.1, Using nodal analysis determine the unknown voltages V_1 , V_2 , V_3 and V_4 . [15 Marks]

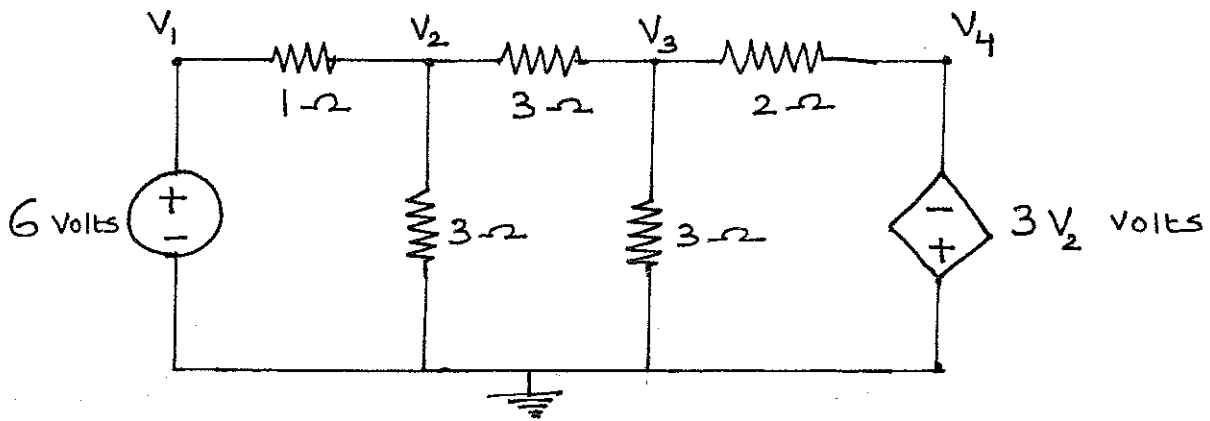


Figure 1

2. For the circuit shown in Figure 2, find the Thevenin equivalent circuit to the left of A, B. Also find the voltage drop across $R_L = 10 \Omega$. [10 Marks]

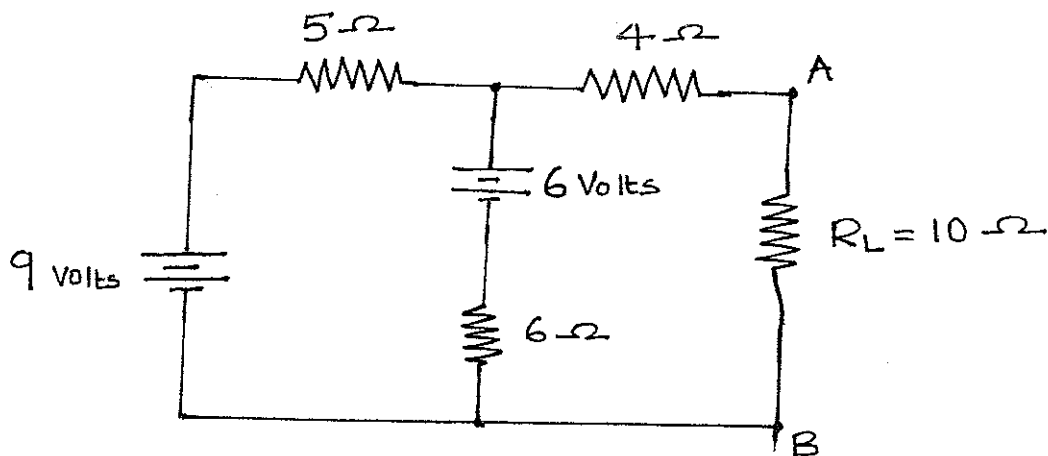


Figure 2

3. For the circuit shown in Figure 3, using superposition theorem find the branch currents i_1 , i_2 and i_3 . **[15 marks]**

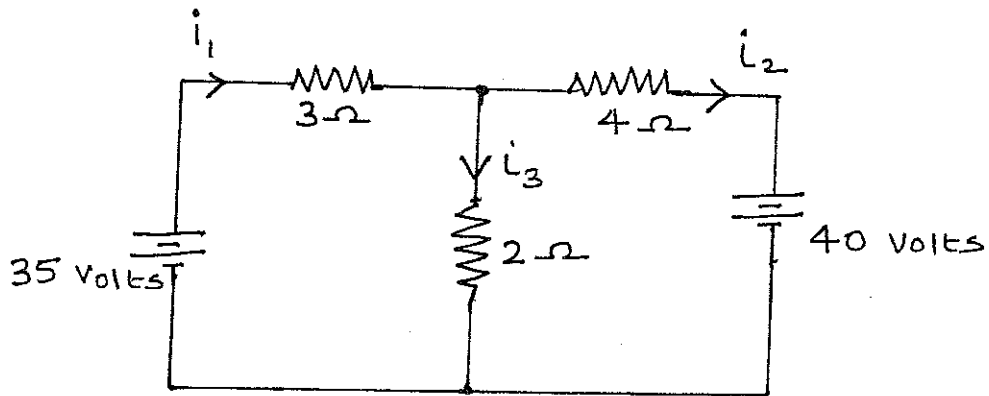


Figure 3

PART B

4. Find the natural response $V_c(t)$ and $i_L(t)$ for the series RLC circuit shown in Figure 4. Given the initial conditions to be $V_c(0) = 2$ Volts and $i_L(0) = 1$ Ampere **[15 marks]**

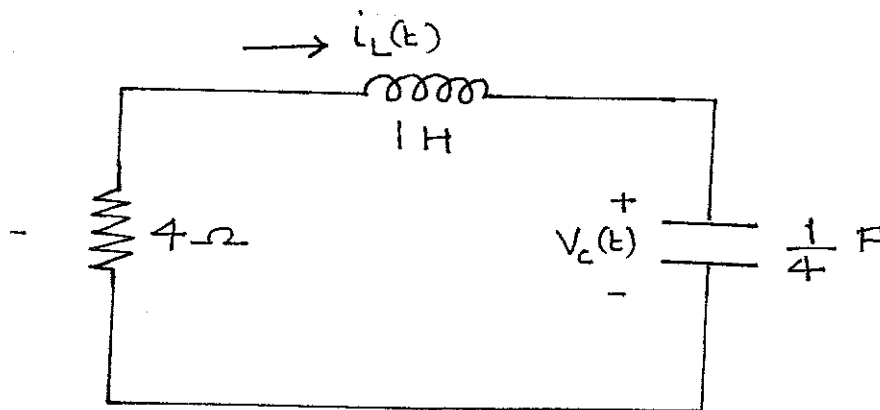
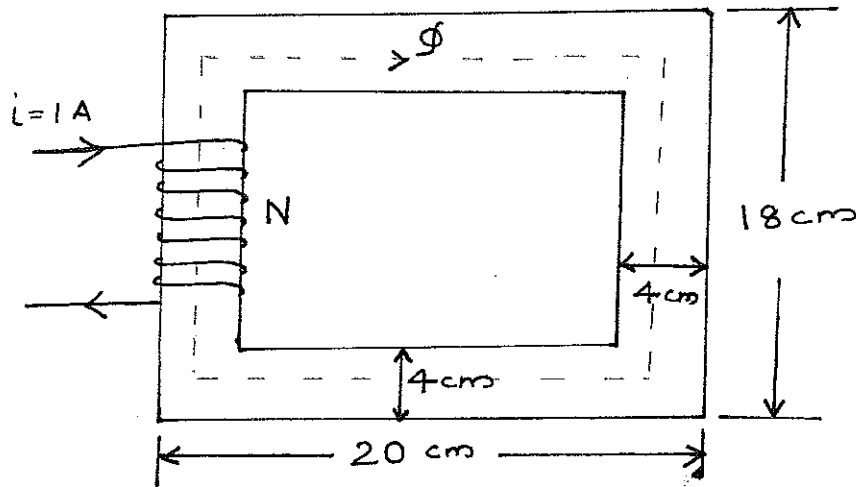


Figure 4

5. A 220 Volts DC shunt motor has a speed of 1000 rpm at full-load armature current of 50 Amperes. Given that the armature resistance is 0.4Ω , determine the no-load speed when the no-load current is 5 Amperes. Also find the speed regulation. **[10 Marks]**

6. The rectangular core shown in Figure 5 has a relative permeability of 1500. If the current in the coil is 1 Ampere, determine the number of coil turns needed to produce a magnetic flux of 3 mWb in the core. [15 Marks]



Area of cross section is $4 \times 4 \text{ cm}^2$ throughout

Figure 5

PART C

7. Using the star-delta transformation for the circuit shown in Figure 6, find (i) R_{eq} across A and B. (ii) Current 'I' drawn by the source. [15 marks]

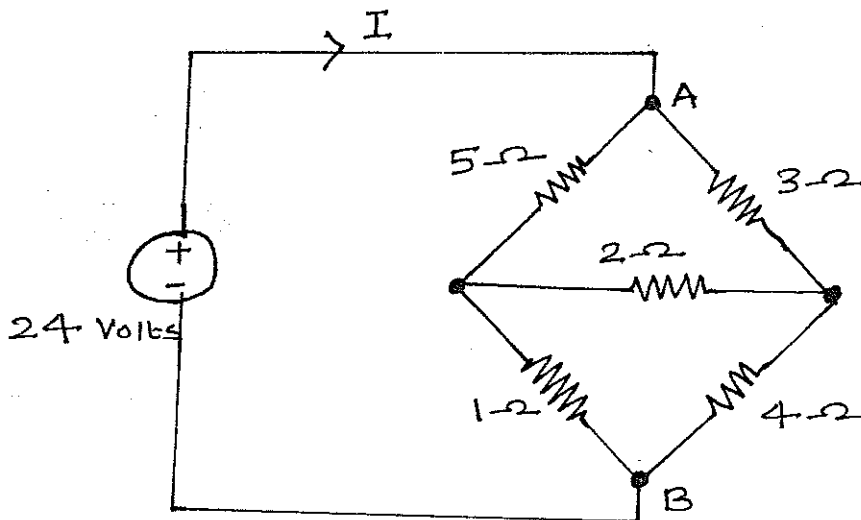


Figure 6

8. For the voltage regulator circuit given in Figure 7. Determine the range of values for R for which the diode will operate in the breakdown state.

current range = $-50\text{mA} \leq i \leq -5\text{mA}$ [15 marks]

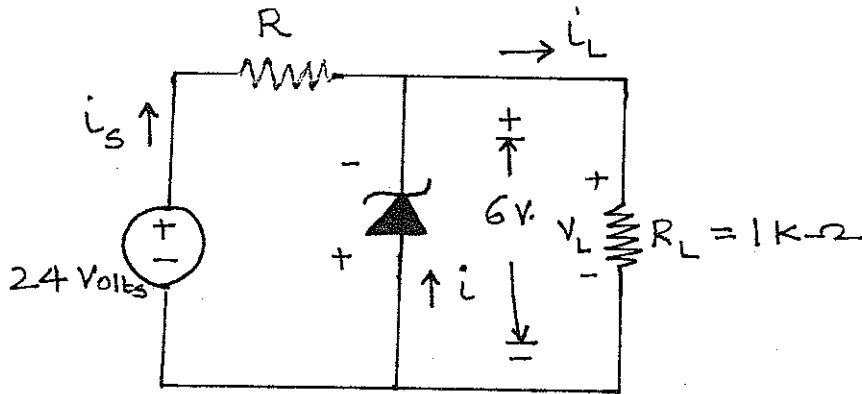
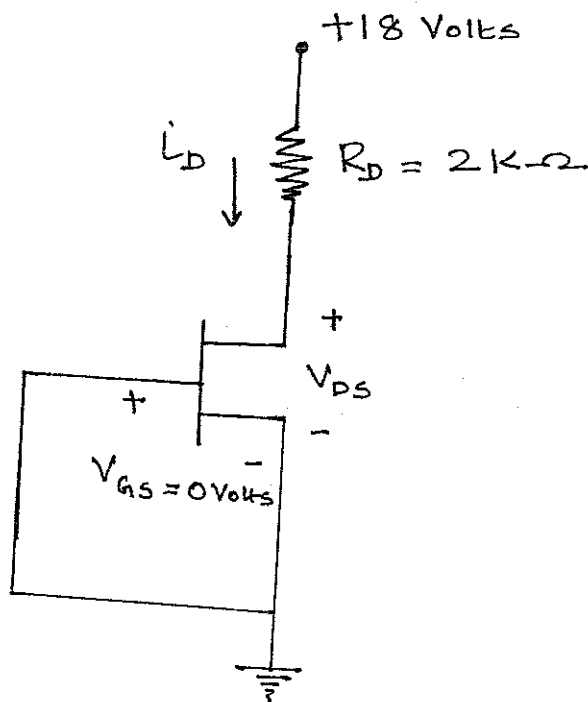


Figure 7

9. For the JFET circuit shown below $I_{DSS} = 8\text{mA}$ and $V_p = -4\text{Volts}$. Analyze the circuit to comment on its region of operation. Also find the corresponding V_{DS} and i_D . [10 marks]



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 FIRST SEMESTER 2013 – 2014
 EEE F111 ELECTRICAL SCIENCES
 TEST 2(OPEN BOOK)

MAXIMUM MARKS: 60
 DATE: 31/10/13

WEIGHTAGE: 20%
 DURATION: 50 MINUTES

1. For the first order circuit shown in Figure 1, find the voltage across capacitor $V_c(t)$ for time, $t < 0$ seconds, $t > 0$ seconds and for $t = 1.3$ milli seconds.

[20 marks]

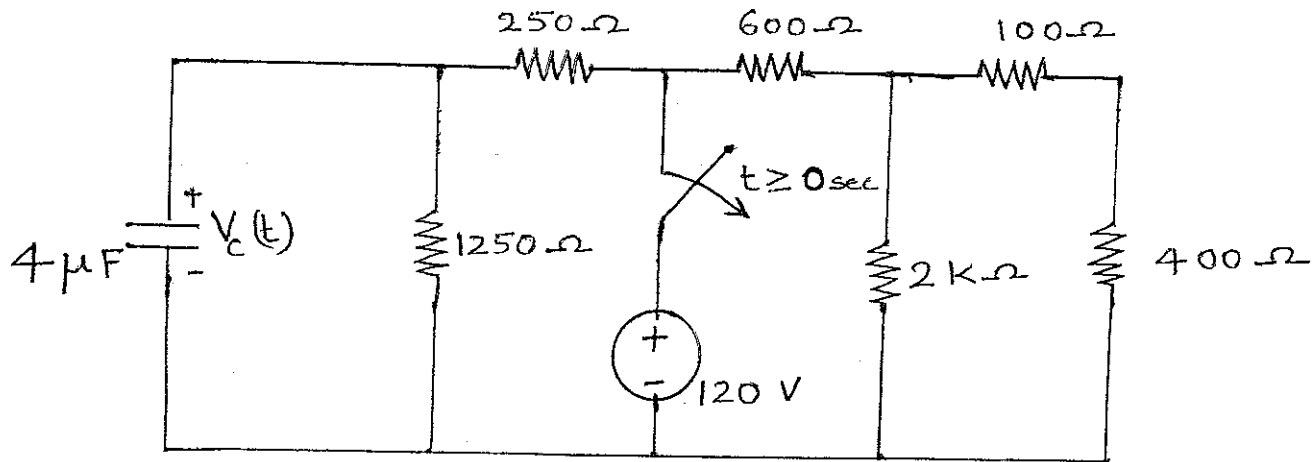


Figure 1

2. Using the Star/Delta transformation, find the total current 'I' shown in Figure.2.

[20 marks]

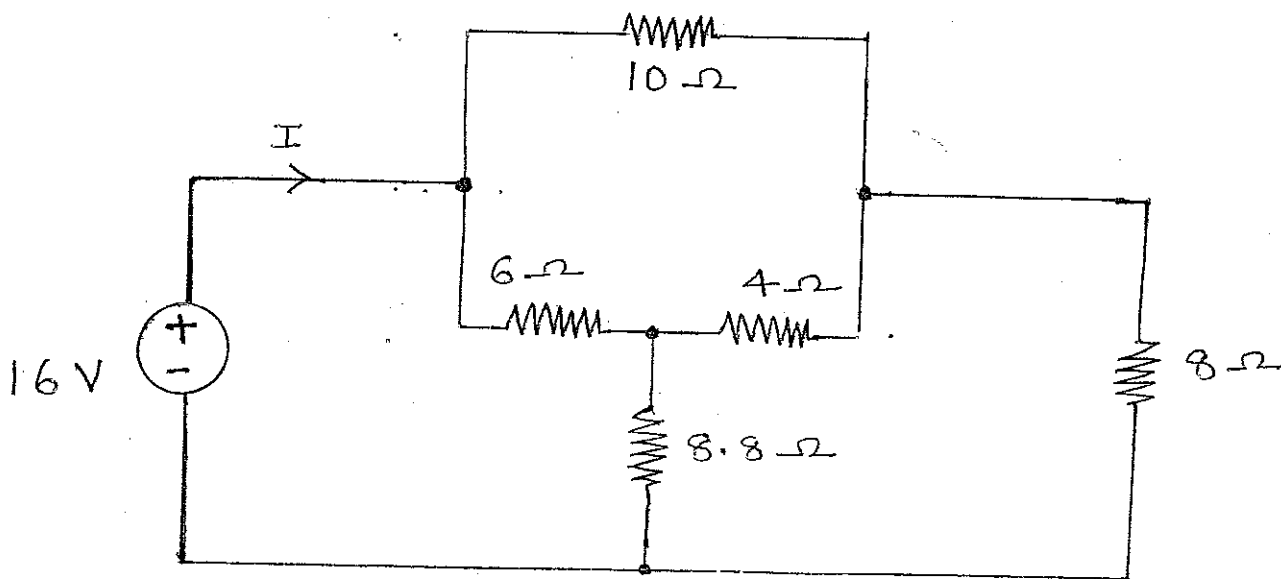


Figure 2

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 EEE F111 ELECTRICAL SCIENCES
 TEST 1(CLOSED BOOK)

MAXIMUM MARKS: 75
 DATE: 07/10/13

WEIGHTAGE: 25%
 DURATION: 50 MINUTES

1. For the circuit shown in Figure 1, (i) Find the Thevenin equivalent of the circuit to the left of 'a' and 'b'. (ii) Use Thevenin equivalent circuit to find the current 'i' and the power absorbed by the R_L , when $R_L=3\ \Omega$. (iii) Determine the value of R_L which absorbs the maximum amount of power, and find this value of power. [35 marks]

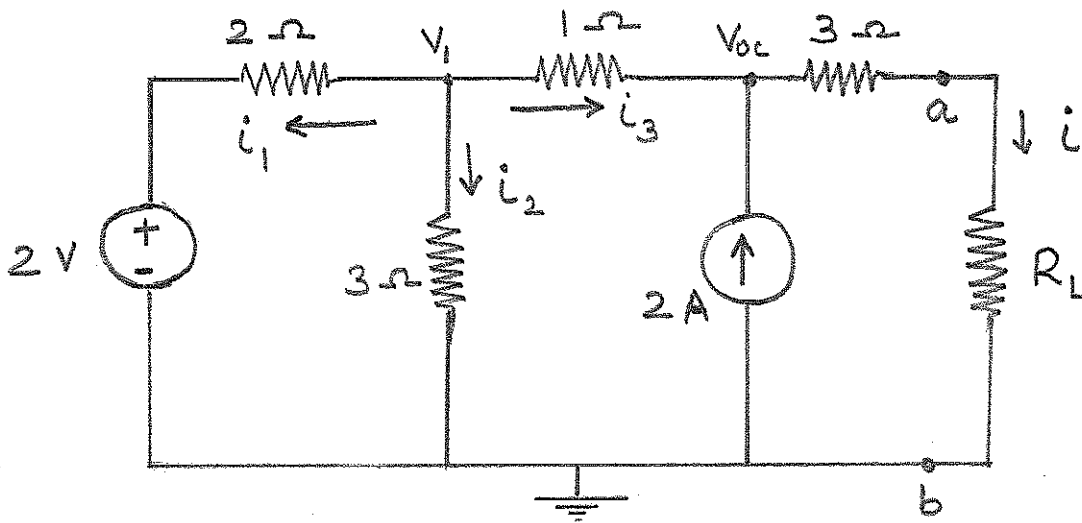


Figure 1

2. For the circuit shown in Figure 2, find the value of Currents i_1, i_2 and i_3 using mesh analysis. [25 marks]

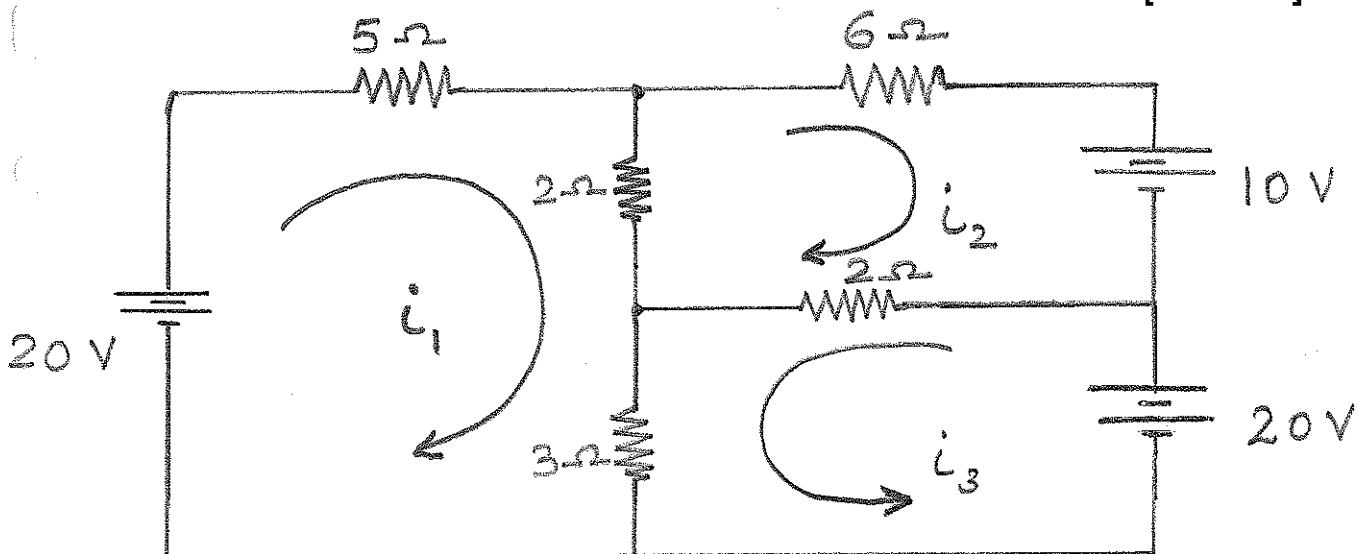


Figure 2

3. Determine the value of current 'i', using superposition theorem in the circuit shown in Figure 3. **[15 marks]**

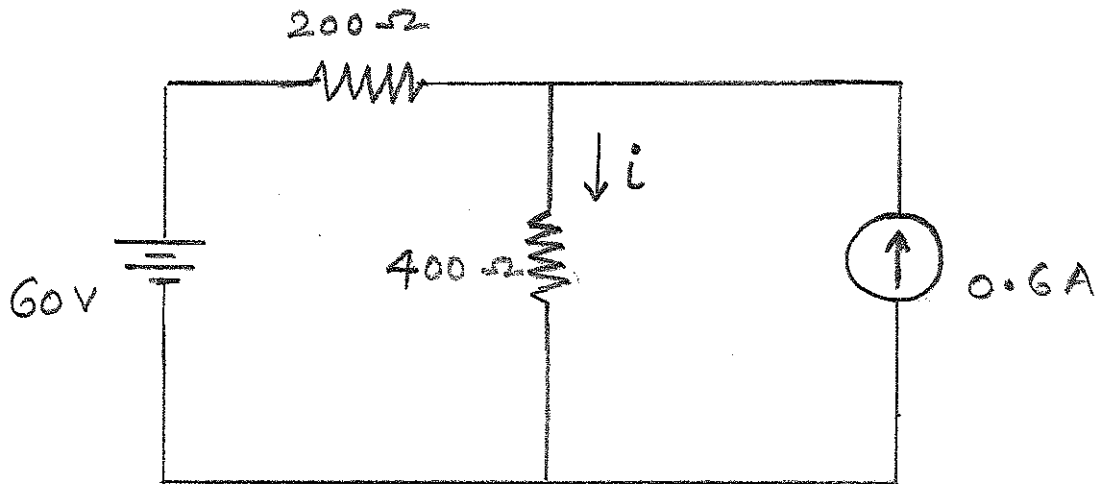


Figure 3

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EEE F111 ELECTRICAL SCIENCES
QUIZ 2 (CLOSED BOOK)

MAXIMUM MARKS: 21
DATE: 08.12.13

SET 1

WEIGHTAGE: 7 %
DURATION: 20 MINUTES

NAME:

Id. No.:

1. The unit of magnetic reluctance is _____ [1M]
2. _____ in magnetic circuit is analogous to current in electric circuit. [1M]
3. A 6 pole DC generator has 300 conductors, 2 parallel paths and runs at 1000 rpm .Find the useful flux per pole if the generated voltage is 400 Volts. [4 M]

4. For a dc generator, the field winding is on the stator and armature winding is on the rotor. _____ (TRUE/FALSE) [2 M]
5. At start the slip of the induction motor is _____ [1 M]
6. The relative permeability of air is approximately _____ [1 M]

7. The energy stored in an ideal transformer is _____ [1 M]

8. A coil of radius R has 400 turns and a self inductance of 32 mH. The inductance of a similar coil of 300 turns will be _____ [3 M]

9. Draw the rotor equivalent circuit diagram of an Induction motor and label the parameters. [3M]

10. Calculate the inductance and energy stored in the magnetic field of an air cored solenoid 50cm long, 5 cm in diameter, wound with 1000 turns and carries a current of 5 Amperes. [4 M]

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QUIZ 1 (CLOSED BOOK)

MAXIMUM MARKS: 24
DATE: 23.09.13

SET 1

WEIGHTAGE: 8 %
DURATION: 20 MINUTES

NAME:

Id. No.:

1. The smallest resistance obtained by connecting 50 resistances of 0.25 ohm each is _____ [2M]

- (a) $(50 \times 0.25) \Omega$ (b) $(50 \times 1/0.25) \Omega$
(c) 200Ω (d) $(1/200) \Omega$

2. An ideal voltage source is described by the function $V(t) = 5 \sin(\pi/2)t$. The value of this voltage source at $t=1$ sec is _____ [2M]

3. Find the equivalent resistance for the circuit shown in Figure 1. Also find the total voltage (V) [4+2M]

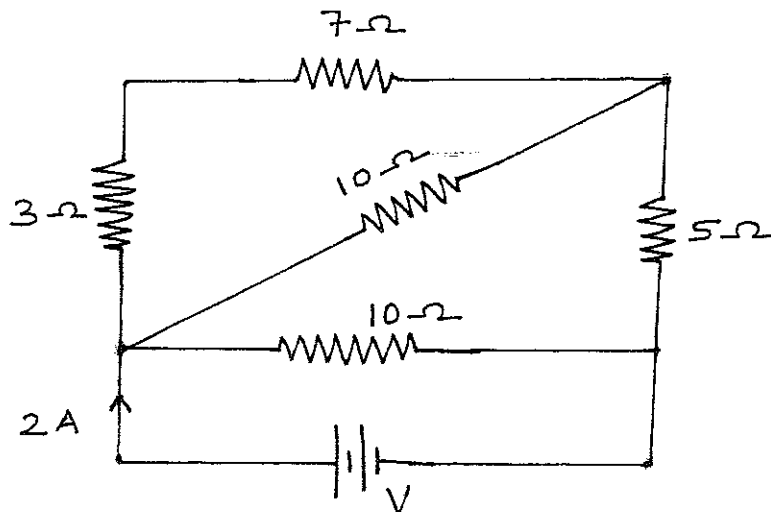


Figure.1

4. The unit for electrical conductance is _____

[1 M]
Page (1/2)

5. For the circuit shown in Figure 2, find Voltage (V)

[2M]

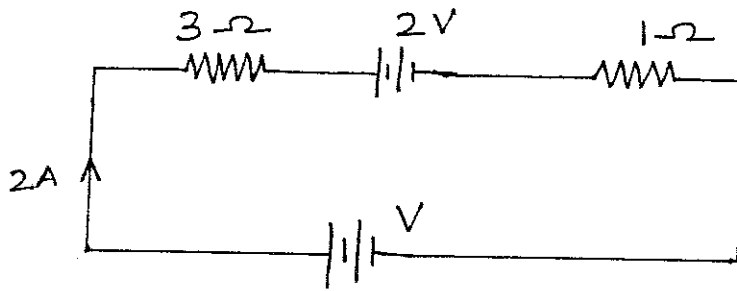


Figure.2

6. Conductance's in parallel behave as a single conductance whose value equals the sum of the individual conductance's. _____ (True/False)

[1M]

7. For the circuit in Figure.3, find the currents i_2 , i_3 , i_4 and i_5

[4 M]

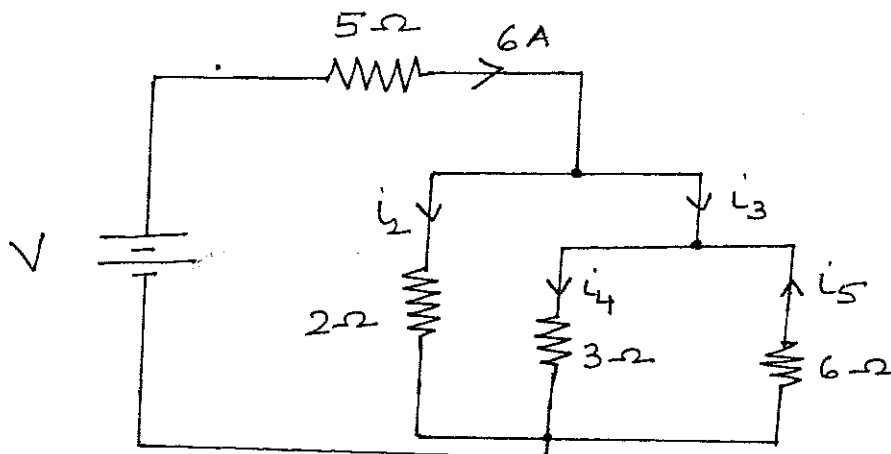


Figure.3

8. The reference node in nodal analysis is always set to zero volts. (True/False)

[1M]

9. Two electric lamps A and B take 0.8 A and 0.9 A respectively when connected across 110 V supply. The value of current when they are connected in series across a 220 V supply, assuming that the lamp resistance to remain unaltered is _____

[4 M]

10. Find the current 'I' for the circuit shown in Figure.4

[1M]

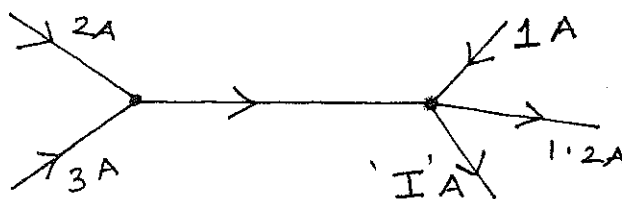


Figure.4