

LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 4

LEFEL 4

EXAMINATION PERIOD
MAY 2020

CYFNOD ARHOLIADAU
MAI 2020

MODULE CODE: M4X00935

ELECTRICAL AND ELECTRONIC PRINCIPLES

TIME: 2 HOURS

ANSWER ALL QUESTIONS

Equipment or materials required – Calculator

Question One (25marks)

- a) For the parallel-series circuit shown in Figure 1, where $R_1 = 6\Omega$, $R_2 = 12\Omega$, $R_3 = 4\Omega$, $R_4 = 3\Omega$ and $R_5 = 5\Omega$. Determine:
- i. The equivalent resistance of the circuit [4]
 - ii. The total current of the circuit [1]
 - iii. The power dissipated by the circuit [1]
 - iv. The current through the 3Ω resistor [2]
 - v. The voltage across the 5Ω resistor [1]
 - vi. The voltage across the 6Ω resistor [2]
 - vii. The current through the 12Ω resistor [2]

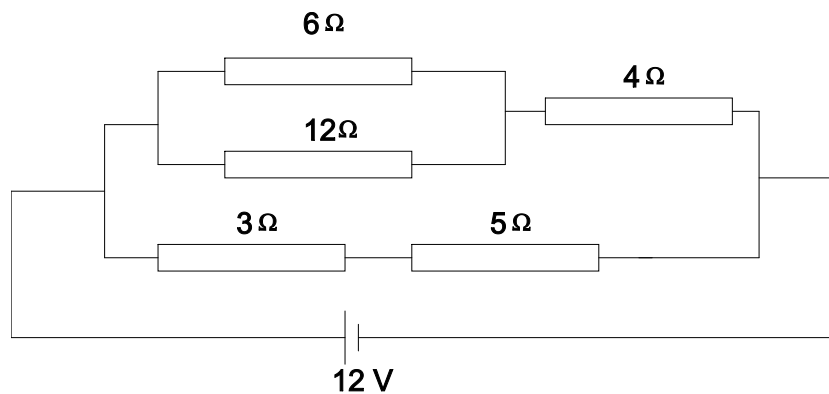
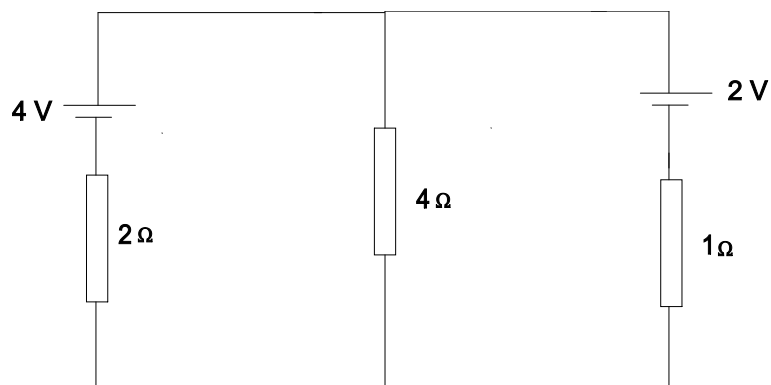


Figure 1

- b) Figure 2 shows a circuit containing two voltage sources with their internal resistance; determine the current in each branch of the network by using Kirchhoff's Laws.



[12]

Figure 2

Question Two (25marks)

For the circuit shown in Figure 3, find:

- i. The Thevenin equivalent circuit for the network [8]
- ii. The value of R_L to provide maximum power to the load [4]
- iii. The maximum power transferred in the load [8]
- iv. The current through R_L when $R_L = 100\Omega$ [5]

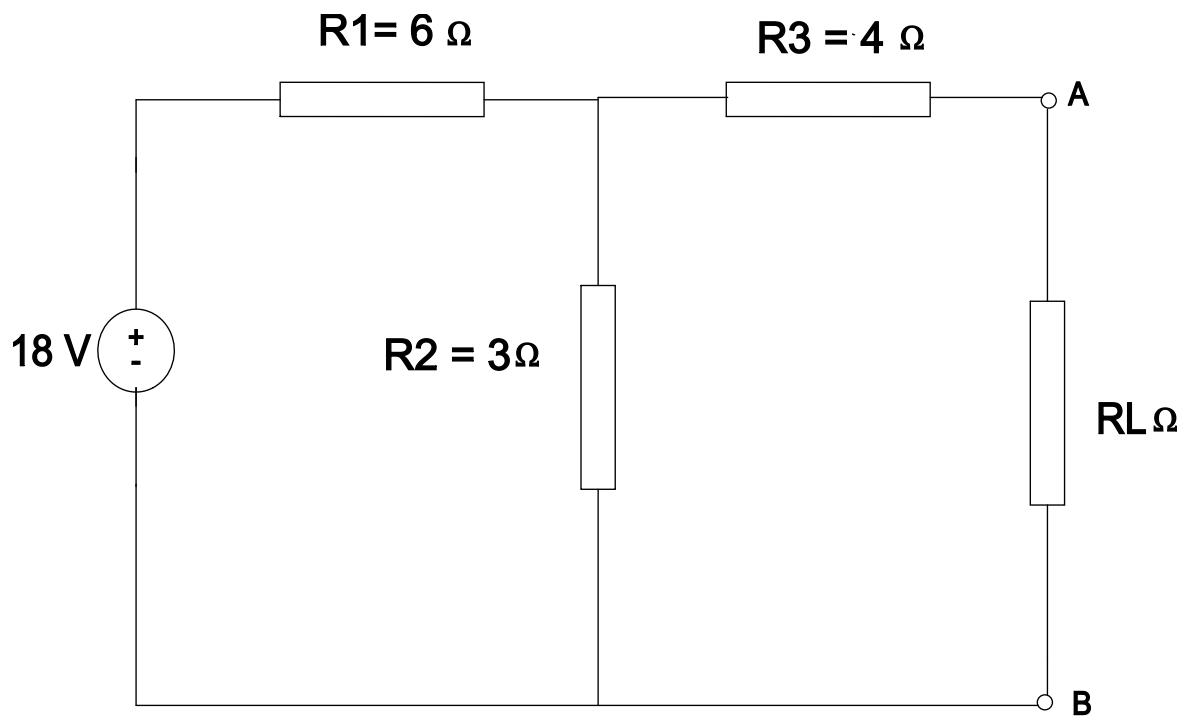


Figure 3

Question three (25marks)

a) A $40\ \mu\text{F}$ capacitor in series with a coil of resistance $8\ \Omega$ and inductance 80mH is connected to a 200V , $100\ \text{Hz}$ supply as shown in Figure 4. Calculate:

- i. The circuit impedance [7]
- ii. The current flowing in the circuit [2]
- iii. The voltage across the coil [2]
- iv. The voltage across the capacitor [2]
- v. The phase angle between voltage and current [2]

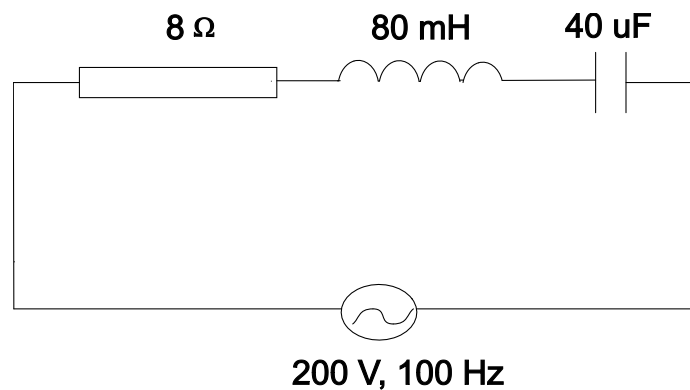


Figure 4

b) A coil of resistance $25\ \Omega$ and inductance 100mH is connected in series with a capacitance of $12\ \mu\text{F}$ across a 200V , variable frequency supply as shown in figure 5. Calculate;

- i. The resonant frequency [2]
- ii. The inductive reactance X_L at resonance [1]
- iii. The capacitive reactance X_C at resonance [1]
- iv. The current at resonance [2]
- v. The voltage across the capacitor at resonance [1]
- vi. The voltage across the inductor at resonance [1]
- vii. The factor by which the voltage across the reactance is greater than the supply voltage. [2]

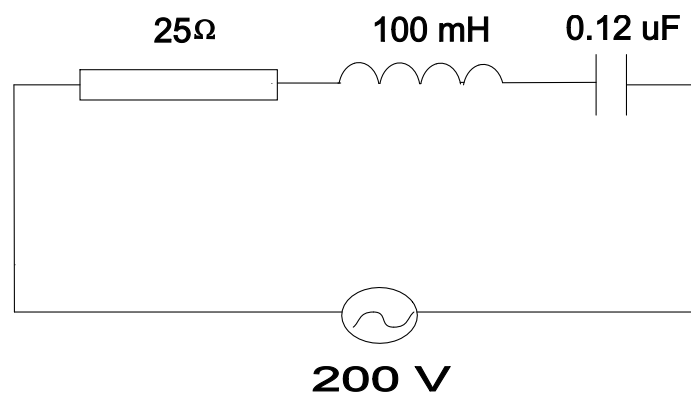


Figure 5

Question Four (10marks)

- a) Assume the diode in Figure 6 is ideal. Determine:
- The value of the current through the diode if the supply voltage (5) volts. [2]
 - The value of the current through the diode if the supply voltage (-5) volts. [2]

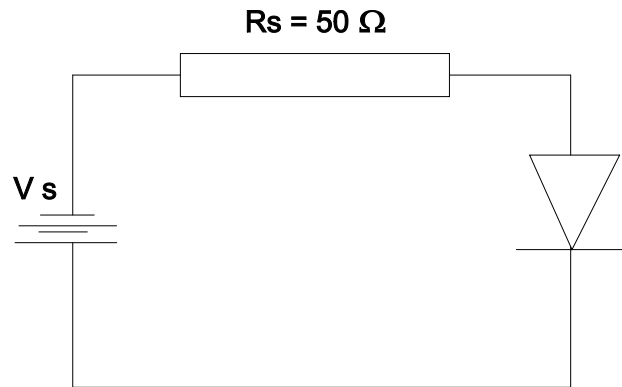


Figure 6

- b) The circuit in Figure 7 is a common emitter amplifier, If $R_1 = 27\text{k}\Omega$, $R_2 = 7.8\text{k}\Omega$, $R_C = 2.2\text{k}\Omega$, $R_E = 1.0\text{k}\Omega$, $V_{CC} = 15\text{V}$, $V_{BE} = 0.7\text{V}$ and $I_{R1} = 0.44\text{mA}$. Determine:
- The current through R_2 [3]
 - The current through R_E , and [2]
 - The gain of the amplifier. [1]

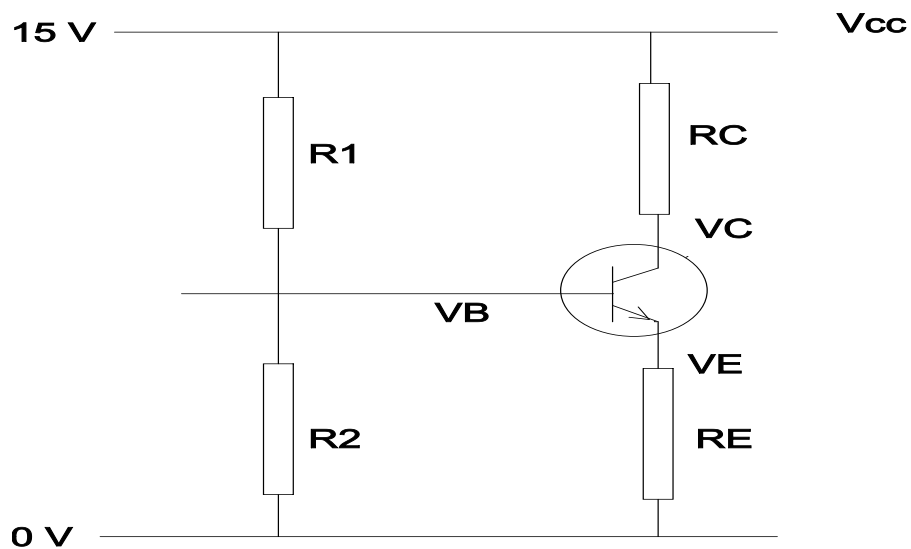


Figure 7

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