

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
100 level 2nd Semester Examination – Sept. / Oct. 2015
CST 101-3 Basic Electricity and Electronics



Instructions to candidates:
Number of questions: Six (06)
Answer all questions
Time allocation: Three (03) hours
Mark allocation: 100

- 1.
- a. State Ohm's Law.
(2 mark)
- b. The field coil of a DC Generator has a resistance of 60Ω . A 240V supply is given to the coil. Given that the current in the coil is to be limited to 2A, calculate the resistance of the resistor to be connected in series with the coil.
(5 mark)
- c. The effective resistance of two resistors connected in parallel is 8Ω . The resistance of one of the resistors is 12Ω . Calculate,
- i. The resistance of the other resistor
 - ii. The effective resistance of two resistors connected in series.
- (6 mark)
- 2.
- a. A 200kVA, 3300V/ 230V, 50Hz, single phase transformer has 80 turns on the secondary winding. Calculate,
- i. Primary and Secondary currents
 - ii. The maximum value of the flux
 - iii. Number of primary turns
- (15 mark)
- b. State the two main parts of a generator and briefly explain how a rotating magnetic field is generated in the rotor of a generator.
(7 mark)

3.

a. Derive an expression for the energy stored in a capacitor of C Farads when charged to a potential difference of V volts.

(5 mark)

b. Derive an expression for the total capacitance of two capacitors which are connected in series.

(5 mark)

c. Draw a circuit which can be used for the full wave rectification in an AC circuit, including all the related wave forms.

(10 mark)

4.

a. State Kirchoff's Laws for an electric circuit by giving an algebraic expression for each Law.

(3 mark)

b.

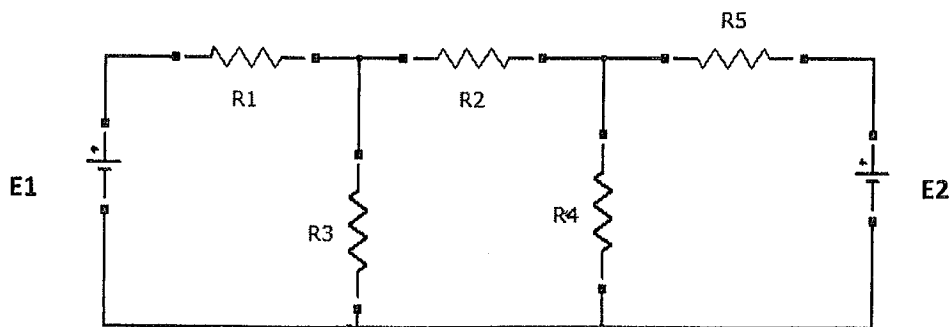


Figure 1

For the given network (Figure 1), $E_1 = 4V$, $E_2 = 6V$. And the resistor values are,

$R_1 = 5\Omega$, $R_2 = 10\Omega$, $R_3 = 15\Omega$, $R_4 = 8\Omega$, and $R_5 = 12\Omega$.

Use the Thevenin's theorem and find the current through 8Ω resistor.

(15 mark)

5.

- a. Three capacitors having the capacitances of $6\mu\text{F}$, $10\mu\text{F}$ and $16\mu\text{F}$ are connected to a 400V supply as shown in the Figure 2. Calculate the voltages across each capacitor.

(5 mark)

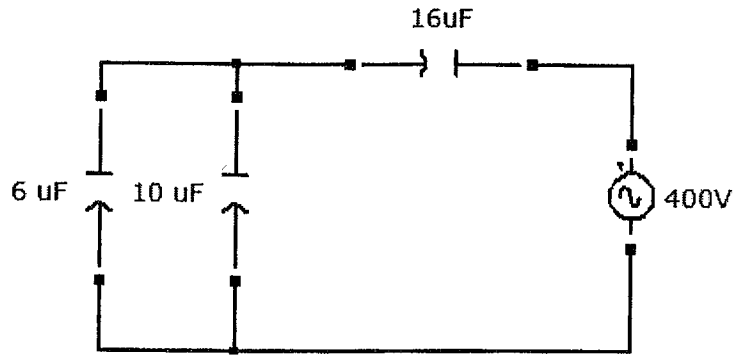


Figure 2

- b. Use Kirchhoff's Laws to find the current through the R_3 resistor in Figure 3.

($R_1 = 5\Omega$, $R_2 = 40\Omega$, $R_3 = 15\Omega$ and $E_1 = 4\text{V}$, $E_2 = 6\text{V}$.)

(7 mark)

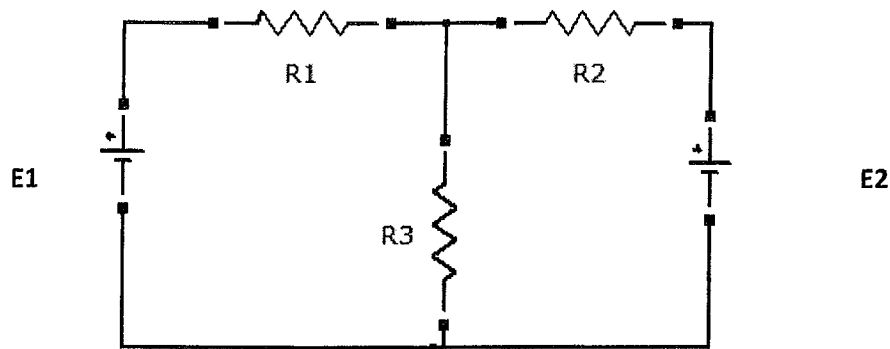


Figure 3



6.

- a. Draw the output characteristics for a p-n-p transistor in common base configuration. Indicate the axes and regions clearly.

(5 mark)

- b. Draw the non-inverting amplifier and derive an expression for the gain of the amplifier.

(5 mark)

- c. Does the gain of an amplifier vary with its operating frequency? Define the terms **Bandwidth** and **Gain** of an amplifier.

(5 mark)