ELT 101: Basic Electricity: AC/DC

## Unit 14 Exam: Capacitance and capacitive circuits

NAME_____

DATE _____

Circle the most correct answer (1 point each for a total of 20 points)

1)   When a capacitor charges, the:

A. Voltage across the plates rises exponentially

B. circuit current falls exponentially

C. capacitor charges to the source voltage in 5 time constants

D. all of the above

2)   The capacitance of a capacitor is directly proportional to:

A. the plate area

B. the distance between the plates

C. the constant of the dielectric used

D. both A and C

E. both A and B

3)   The capacitance of a capacitor is inversely proportional to:

A. the plate area

B. the distance between the plates

C. the dielectric used

D. both A and C

4)   Total capacitance of <u>series</u> capacitors is calculated by:

A. adding up the individual capacitances

B. using the reciprocal capacitance formula

C. dividing four equal value capacitors by four

D. both A and C

E. both B and C

5)   A capacitor in an RC circuit will fully charge in how many time constants?

A. one

B. three

C. five

D. it depends on the circuit

6)   Capacitors store energy in the form of:

A. a magnetic field

B. an electrostatic field

C. an electromagnetic field

D. a positive field

7)   In two time constants a capacitor will discharge to what % of applied voltage.?

A. 63.2%

B. 86.5%

C. 36.8%

D. 13.5%

8)   For a given value of C, if f is increased, then X_C will:

A. increase

B. decrease

C. remain the same

D. it depends on the frequency

9)   For a given value of f, if C is decreased, X_C will:

A. increase

B. decrease

C. remain the same

D. none of the above

10) Capacitive reactances in parallel add like resistances in:

A. series

B. parallel

C. neither of these

11) If f and C are both doubled in a given circuit, the X_C will:

A. increase two times

B. decrease two times

C. increase four times

D. decrease four times

12) What is the total X_C of two series connected 1uF capacitors at a frequency of 200Hz?

A. 3180 ohms

B. 15.9 ohms

C. 318 ohms

D. 1.59K ohms

E. none of the above

13) In a purely capacitive circuit:

A. the current flowing in the circuit leads the voltage across the capacitor by 90-degrees

B. the circuit current and resistor voltage are in phase

C. the current leads the voltage by 45 degrees

D. the current leads the voltage by a phase angle between 0 and 90 degrees

14) For the schematic symbol shown below, what does the dotted line indicate?

A. the capacitors are in series

B. the capacitors are in phase

C. the capacitors are in parallel

D. the capacitors are ganged
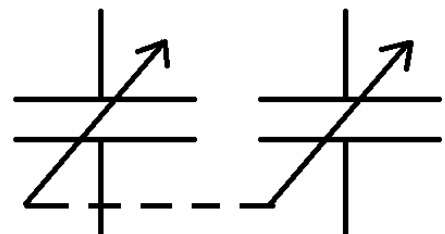
15)   The schematic symbol shown at right is for a:

       A. nailed capacitor

       B. trimmer capacitor

       C. ganged capacitor

       D. variable capacitor

**Match the term to its definition (1 point each for a total of 10 points)**

A) farad   _____ time needed to reach 63.2% of applied voltage

B) X_C _____ ability to store a charge

C) capacitor   _____ polarity sensitive

D) phase shift   _____ non-conductive material

E) picofarad   _____ mechanically coupled capacitors with one control

F) capacitance   _____ occurs between voltage and current in a capacitive circuit

G) time constant   _____ capacitive reactance

H) ganged capacitor   _____ two plates separated by a dielectric

I) dielectric   _____ unit of capacitance
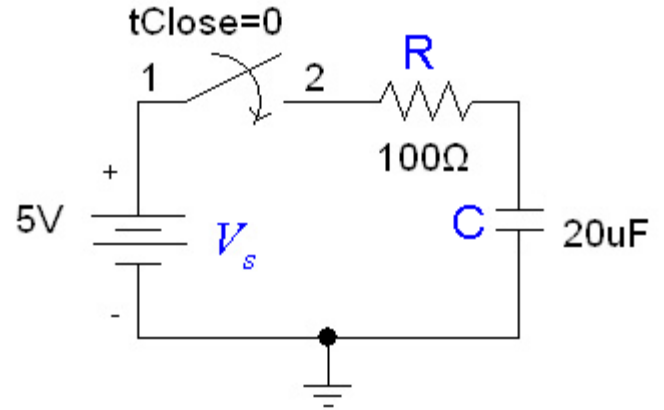
J) electrolytic cap   _____ 1×10^{-12} farad

Solve the following (points shown for each for a total of 10 points) Show your work!

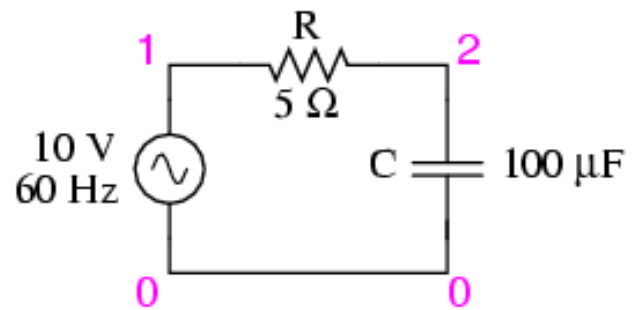1) Calculate the total capacitance of the circuit shown below (**3 points**).

0.1F

4.7F

2.2F
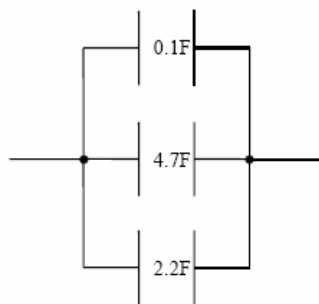
Ctotal = ...

= ....

2)   Once the switch is closed, how long will
        it take the capacitor in the circuit shown
        to fully charge? **(4 points)**

tClose=0

R

1   2

100Ω

+

5V

V_s

C   20uF

3)   What is the capacitive reactance of the circuit

        shown? **(3 points)**

R

1   2

5 Ω

10 V
60 Hz

C   100 μF

0   0

Points possible:

        Multiple choice: 30
        Matching: 10
        Problems: 10
        Total   50

***** end of unit 14 exam *****