1) During any process, the net charge of a closed system _____.

a) increases
b) decreases
c) stays constant

2) In equilibrium, the electric field in a conductor is _____.

a) always changing
b) a constant non-zero value
c) zero

3) Equipotential surfaces are _____ to electric field lines.

a) parallel
b) perpendicular
c) unrelated

4) Capacitors store _____.

a) electric charge
b) momentum
c) magnetic fields

5) Ohm's Law gives the relationship between potential difference and current for a _____.

a) resistor
b) inductor
c) capacitor

6) Outlets in your house are all wired in _____.

a) series
b) parallel
c) either series or parallel

7) Outside a magnet, field lines point from _____.

a) north to south
b) south to north
c) neither

8) A charged particle moving in a magnetic field will accelerate _____ the field.

a) with
b) perpendicular to
c) against

9) A change in _____ will always induce an EMF.

a) magnetic field
b) magnetic force
c) magnetic flux

10) At resonance, the impedance of the circuit is _____.

a) zero
b) a maximum
c) a minimum

11) In an alternating current RLC circuit, the voltage across the resistor _____ leads the current through the resistor.

a) sometimes
b) always
c) never

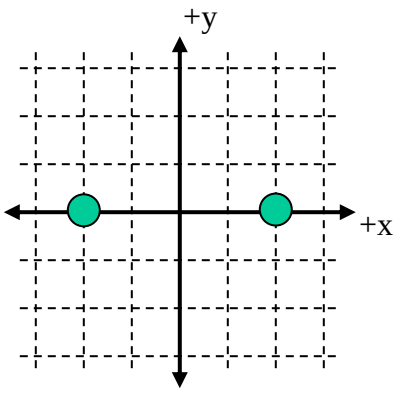
12) A radar gun is used to catch speeding cars moving away from the radar gun. The frequency of the reflected radiation is _____ the frequency of the original radiation.

a) greater than
b) less than
c) equal to

Two charges are situated as shown in the diagram (each grid line is separated by 1 meter). The left charge is $+2\times10^{-6}$ C. The right charge is -3×10^{-6} C.

13) What is the magnitude of the net electric force on each charge?

a) 0.00042 N
b) 0.00064 N
c) 0.0017 N
d) 0.0034 N
e) 0.0068 N



14) What is the net electric potential at the point (0, 2) on the positive y-axis?

a) -3182 V
b) -1125 V
c) 0 V
d) 1125 V
e) 3182 V

15) Where (on the x-axis) is the electric field zero?

a) 4.85 m
b) 0 m
c) -6.32 m
d) -10.5 m
e) -19.8 m

A square loop, in the plane of the page (10 cm on a side), is pushed into a uniform magnetic field, that points into the page, with a constant velocity of 28 m/s. A force of 15 N is needed to do this, and a current of 0.13 A is induced in the loop.

16) What is the magnitude of the magnetic field?

a) 1154 T
b) 2390 T
c) 3187 T
d) 4485 T
e) 5900 T

17) What is the resistance of the loop?

a) 14,850 ohms
b) 24,850 ohms
c) 34,850 ohms
d) 44,850 ohms
e) 54,850 ohms

An electron moves into (with v = 650,000 m/s) a magnetic field that has a strength of 0.00019 T. The mass of an electron is 9.11 x 10^{-31} kg.

18) What is the radius of curvature of the path of the electron?

a) 1.9 cm
b) 2.9 cm
c) 3.9 cm
d) 4.9 cm
e) 5.9 cm

19) What is the magnitude of acceleration of the electron?

a) 1.17 x 10^{13} m/s^2
b) 2.17 x 10^{13} m/s^2
c) 3.17 x 10^{13} m/s^2
d) 4.17 x 10^{13} m/s^2
e) 5.17 x 10^{13} m/s^2

Two parallel currents are 18 cm apart. One wire has a current of 16 A upward and the other has a current of 22 A downward.

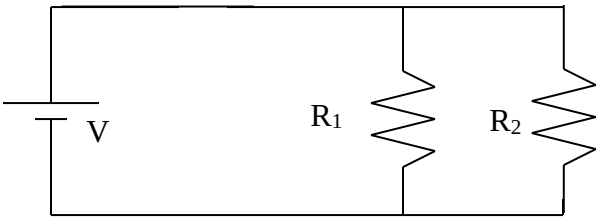
20) What is the magnitude of the magnetic field at a location between them that is 5 cm from the 16 A current and 13 cm from the 22 A current?

a) 5.8 x 10^{-5} T
b) 6.8 x 10^{-5} T
c) 7.8 x 10^{-5} T
d) 8.8 x 10^{-5} T
e) 9.8 x 10^{-5} T

You are given the following circuit with V = 28 V, R_1 = 5 Ω and R_2 = 10 Ω.

21) Calculate the current through the battery.

a) 0 A
b) 2.8 A
c) 5.6 A
d) 8.4 A
e) 28 A



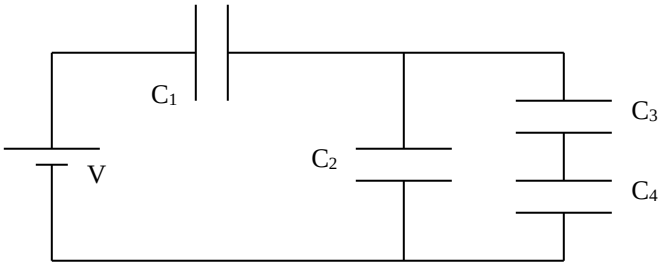
22) If R_1 was made from copper ($\rho = 1.7\times10^{-8}$ Ω m) and is 3 m long, what is its cross sectional area?

a) 1.02×10^{-8} m^2
b) 2.02×10^{-8} m^2
c) 3.02×10^{-8} m^2
d) 4.02×10^{-8} m^2
e) 5.02×10^{-8} m^2

The following circuit has the values: V = 28 V,
C_1 = 1 μF, C_2 = 2 μF, C_3 = 3 μF, C_4 = 4 μF.

23) What is the charge on capacitor C_2?

a) 3.9 μC
b) 5.9 μC
c) 7.9 μC
d) 9.9 μC
e) 11.9 μC

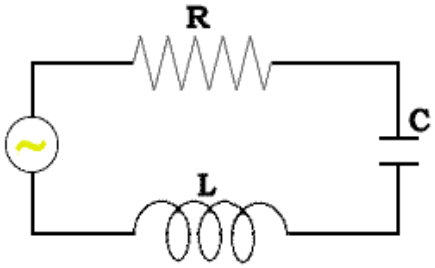


24) What is the potential difference across capacitor C_4?

a) 1.55 V
b) 2.55 V
c) 3.55 V
d) 4.55 V
e) 5.55 V

A simple RLC series circuit with R = 16 ohms, C = 4.1×10^{-6} C, and L = 5.3×10^{-3} H. is connected to a generator (f = 1350 Hz, V = 15 V).

25) What is the maximum voltage across the resistor?



(a) 10.5 V
(b) 11.5 V
(c) 12.5 V
(d) 13.5 V
(e) 14.5 V

26) What is the reactance of the inductor?

(a) 15 ohms
(b) 25 ohms
(c) 35 ohms
(d) 45 ohms
(e) 55 ohms

27) What is the average power dissipated in the circuit?

(a) 1.47 W
(b) 2.47 W
(c) 3.47 W
(d) 4.47 W
(e) 5.47 W

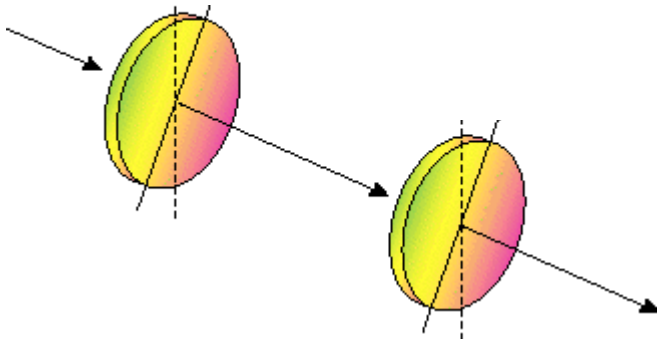
28) What is the current in the circuit when the voltage across the generator is a maximum?

(a) 0.16 A
(b) 0.26 A
(c) 0.36 A
(d) 0.46 A
(e) 0.56 A

Unpolarized light with a wavelength of 400 nm (400×10^{-9} m) and an intensity of 4.6 W/m^2 is incident on two linear polarizers.

29) What is the frequency of this radiation?

(a) 3.5×10^{14} Hz
(b) 5.5×10^{14} Hz
(c) 7.5×10^{14} Hz
(d) 9.5×10^{14} Hz
(e) 11.5×10^{14} Hz



30) If the intensity after the second polarizer is 0.9 W/m^2, what is the angle between the transmission axes of the two polarizers?

(a) 31°
(b) 41°
(c) 51°
(d) 61°
(e) 71°

Online Physics 122 Formulas

$$F = ma \qquad F = \frac{kq_1q_2}{r^2} \qquad E = \frac{F}{q_o} \qquad E = \frac{kq}{r^2}$$

$$U = \frac{kq_1q_2}{r} \qquad V = \frac{U}{q_o} \qquad V = \frac{kq}{r} \qquad E = \frac{V}{d}$$

$$C = \varepsilon_o \frac{A}{d} \qquad C = \frac{Q}{V} \qquad U = \frac{1}{2}QV \qquad I = \frac{Q}{t}$$

$$C_p = C_1 + C_2 \qquad \frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} \qquad R_s = R_1 + R_2 \qquad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R = \rho \frac{L}{A} \qquad V = IR \qquad P = IV \qquad Q = Q_o e^{\frac{-t}{RC}}$$

$$Q = Q_o\left(1 - e^{\frac{-t}{RC}}\right) \qquad F = qvB\sin\theta \qquad F = ILB\sin\theta \qquad B = \frac{\mu_o I}{2\pi r}$$

$$B = \mu_o nI \qquad r = \frac{mv}{qB} \qquad \Phi_B = BA\cos\phi \qquad emf = vBL$$

$$emf = -N\frac{\Delta\Phi_B}{\Delta t} \qquad U = \frac{1}{2}LI^2 \qquad \frac{V_s}{V_p} = \frac{N_s}{N_p} \qquad V_{rms} = I_{rms}Z$$

$$Z = \sqrt{R^2 + \left(X_L - X_C\right)^2} \qquad X_c = \frac{1}{2\pi fC} \qquad X_L = 2\pi fL$$

$$\overline{P} = V_{rms}I_{rms}\cos\phi \qquad \tan\phi = \frac{X_L - X_C}{R} \qquad f_o = \frac{1}{2\pi\sqrt{LC}} \qquad c = \lambda f$$

$$c = \frac{1}{\sqrt{\varepsilon_o\mu_o}} \qquad U = \frac{1}{2}\varepsilon_o E^2 + \frac{1}{2\mu_o}B^2 \qquad E = cB$$

$$I = I_o\cos^2\theta$$

$$k = 8.99\times10^9\, Nm^2/C^2$$
$$\varepsilon_o = 8.85\times10^{-12}\, C^2/m^2N$$
$$q_e = 1.60\times10^{-19}\, C$$
$$\mu_o = 4\pi\times10^{-7}\, Tm/A$$
$$c = 3\times10^8\, m/s$$

ON-LINE PHYSICS 122
EXAM #1
MR. POTTER

Name: _____ Date: _____

1) Bubble in the ID number section of the scantron.

2) This Exam is 90 min long - 30 multiple-choice questions. Choose the one BEST answer for each question. You are not penalized for guessing. Watch your time! (Answer all questions.)

3) You may use only a pencil and calculator. (Formula sheet is provided.)

4) Use the test as scratch paper (or the paper provided by the testing center). Hand EVERYTHING back in or you will receive a 0 on the exam!

5) Scoring: all 5 answer choice questions are 6 pts. each, all 3 answer choice questions are 3 pts. each, all 2 answer choice questions are 2 pts. each. Total possible points = 144 pts.

6) This is test form __A__. Be sure to FILL THIS IN on your scantron form. All forms are "equivalent" tests (only numbers have been changed.)

7) Also, write your name, the class, the date, and my name on the scantron form.

Good Luck!

DID YOU BUBBLE IN AN ID NUMBER AND TEST FORM ON THE SCANTRON?

(see front page for instructions)