1) Opposite charges _____ and like charges _____.

a) attract, repel
b) repel, attract
c) attract, attract

2) The electric field surrounding two equal positive charges separated by a distance of 10 cm is zero _____; the electric potential surrounding two equal positive charges separated by a distance of 10 cm is zero _____.

a) nowhere, at one point
b) at one point, at two points
c) at one point, nowhere

3) Electric field lines point in the direction of _____ electric potential.

a) increasing
b) decreasing
c) constant

4) As you increase the charge on a capacitor, its capacitance _____.

a) increases
b) decreases
c) remains the same

5) Resistors in series have the same _____ them; resistors in parallel have the same _____ them.

a) potential drop across, current through
b) current through, potential drop across
c) current through, current through

6) A battery is a source of constant _____.

a) current
b) potential difference
c) resistance

7) The magnetic force on a charged particle in a magnetic field (if there is a force) is always _____ to both the magnetic field and the direction of motion of the charged particle.

a) parallel
b) perpendicular
c) anti-parallel

8) Two parallel wires with currents running in the same direction _____ each other.

a) attract
b) repel
c) exert no force on

9) A _____ through a loop of wire will induce a current in that loop of wire.

a) magnetic field
b) magnetic flux
c) changing magnetic flux

10) An induced current in a loop of wire will create its own magnetic flux that _____ opposes the change in the original external magnetic flux.

a) sometimes
b) always
c) never

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

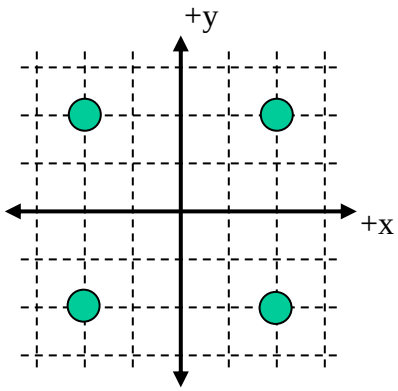
a) sometimes
b) always
c) never

12) At resonance, the impedance (Z) of the circuit is equal to _____.

a) the resistance (R)
b) the capacitive reactance (X_C)
c) the inductive reactance (X_L)

Four charges are situated as shown in the diagram (each grid line is separated by 1 meter). The two upper charges have a charge of -3 μC (-3×10^{-6} C). The two lower charges have a charge of +3 μC ($+3\times10^{-6}$ C).

13) What is the magnitude of the net electric field at the point (0, 0)?



a) 0 N/C
b) 3,375 N/C
c) 4773 N/C
d) 9546 N/C
e) 13,500 N/C

14) What is the net electric potential at the point (0, 0)?

a) -38,184 V
b) -9545 V
c) 0 V
d) 9545 V
e) 38,184 V

15) What is the magnitude of the net force on the upper right charge?

a) 0.0036 N
b) 0.0046 N
c) 0.0056 N
d) 0.0066 N
e) 0.0076 N

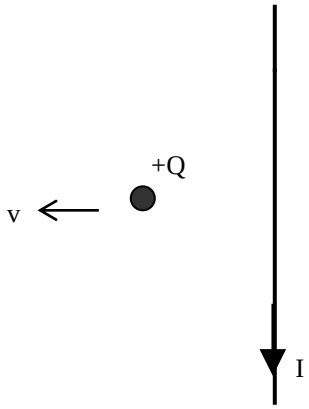
16) What is the net work needed to bring in all four charges from infinity to build this configuration?

a) -0.029 J
b) -0.037 J
c) -0.055 J
d) -0.069 J
e) -0.072 J

A positively charged particle (with Q = +8 μC) moves away (with v = 20 m/s) from a wire with current. At the instant shown, the charged particle is 10 cm from the current and the magnetic field there has a strength of 0.15 mT (0.00015 T).

17) What is the current in the wire?

a) 55 A
b) 65 A
c) 75 A
d) 85 A
e) 95 A



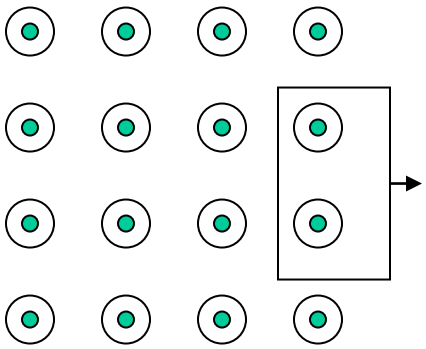
18) What is the magnitude of the magnetic force on the charged particle.

a) 2.4×10^{-8} N
b) 3.4×10^{-8} N
c) 4.4×10^{-8} N
d) 5.4×10^{-8} N
e) 6.4×10^{-8} N

A loop with a length of 10 cm and a width of 5 cm is moving (with a speed of v = 12 m/s) out of the magnetic field (with strength of 3.78 T) as shown below. The total resistance of the loop is 0.04 ohms.

19) What is induced emf in the loop?

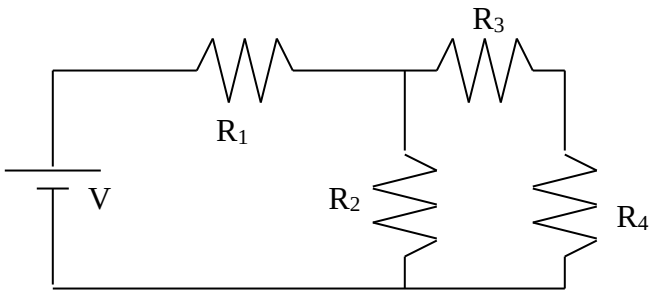
a) 1.536 V
b) 2.536 V
c) 3.536 V
d) 4.536 V
e) 5.536 V



20) What is the magnitude of the magnetic force on the loop?

a) 12.9 N
b) 22.9 N
c) 32.9 N
d) 42.9 N
e) 52.9 N

The following circuit has the values: V = 6 V, R_1 = 3 Ω, R_2 = 4 Ω, R_3 = 2 Ω, R_4 = 5 Ω.



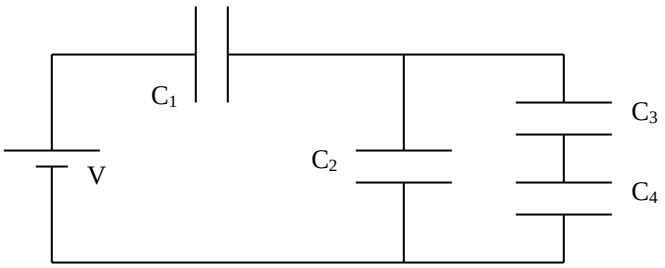
21) What is the total equivalent resistance of the circuit?

a) 1.11 ohms
b) 3.33 ohms
c) 5.55 ohms
d) 7.77 ohms
e) 9.99 ohms

22) What is the net power dissipated in the circuit?

a) 3.6 W
b) 4.6 W
c) 6.5 W
d) 10.8 W
e) 32.4 W

The following circuit has the values: V = 6 V, C_1 = 3 μF, C_2 = 4 μF, C_3 = 2 μF, C_4 = 5 μF.



23) What is the charge on capacitor C_4?

a) 1.05 μC
b) 3.05 μC
c) 5.05 μC
d) 7.05 μC
e) 9.05 μC

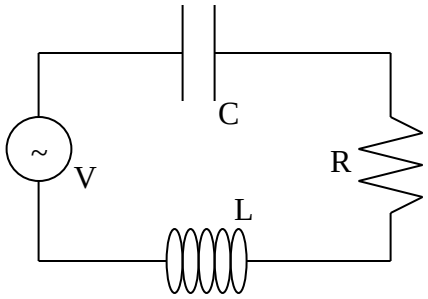
24) What is the potential difference across capacitor C_2?

a) 1.14 V
b) 2.14 V
c) 3.14 V
d) 4.14 V
e) 5.14 V

Shown below is an LRC circuit connected to an AC generator with L = 285 mH, C = 13 μF, and R = 39 Ω. The maximum generator voltage of 120 V oscillates at its resonant frequency.

25) What is the resonant frequency of the circuit?

a) 32 Hz
b) 83 Hz
c) 129 Hz
d) 172 Hz
e) 201 Hz



26) What is the maximum current in the circuit?

a) 0.1 A
b) 1.1 A
c) 2.1 A
d) 3.1 A
e) 4.1 A

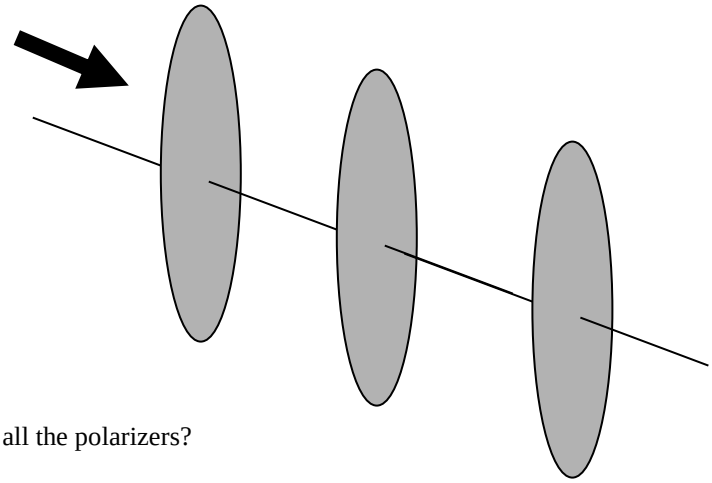
27) What is the maximum voltage across the capacitor?

a) 56 V
b) 256 V
c) 456 V
d) 656 V
e) 856 V

28) If the frequency is increased to 234 Hz, what will the maximum current in the circuit be?

a) 0.33 A
b) 1.33 A
c) 2.33 A
d) 3.33 A
e) 4.33 A

Unpolarized light with initial intensity of 28 W/m^2 goes through three linear polarizers. The first polarizer has a transmission axis at an angle of 0° with respect to the vertical, the second polarizer has a transmission axis at an angle of 45° with respect to the vertical, and the third polarizer has a transmission axis at an angle of +60° with respect to the vertical.



29) What is the intensity of light after all the polarizers?

a) 28 W/m^2
b) 14 W/m^2
c) 7.5 W/m^2
d) 6.53 W/m^2
e) 0 W/m^2

30) What angle (with respect to the vertical) should the last polarizer be at to make the final intensity of light ¼ the original intensity?

a) 0°
b) 30°
c) 45°
d) 60°
e) 90°

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 ____. 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)