Prince Sultan University

Department of Mathematics & Physics

PHY205- General Physics2

Final Exam

First Semester, Term 121

Tuesday 1/1/2013

Examination Time : 120 minutes

Name (Please Print): . . . . . .

Student I.D: . . . . . .

Important Instructions:

1. You can use a scientific calculator that does not have programming or graphing capabilities.
*2. You may **NOT** borrow a **calculator** from anyone.*
*3. Do not use **RED pen**.*
*4. This is a closed books and notes exam. Do **NOT** use notes or textbooks.*
*5. There should be **NO** talking during the examination.*
*6. Your will be **expelled** immediately from the exam if your mobile phone is seen or heard.*
*7. Any signs of **cheating** may cause you being expelled from the exam.*
*8. This examination has **20 multiple choice** questions, each question worth **2 points**. Make sure your paper has all the questions and problems.*

A charge of **- 40 μC** is located on the y axis at **y = –20 cm**, and a second charge of **10μC** is placed on the y axis at **y = 30 cm**. Use these information to answer the following **three** questions:

1- The electric force between the two charges is:
a) 14.4 N b) 28.8 N c) 43.2 N d) 57.6 N

2- The magnitude of the net electric field at the origin is:
a) 13×10^6 N/C b) 12×10^6 N/C c) 11×10^6 N/C d) 10×10^6 N/C

3- The net electric potential at the origin is:
a) 3×10^5 volt b) -18×10^5 volt c) 15×10^5 volt d) -15×10^5 volt

4-Two charges q_1= -20 nC and q_2 = 30 nC are inside a closed cylinder of length 0.5m and radius 0.1m. The net electric flux through the cylinder is:
a) 2260 N/C.m^2 b) 3390 N/C.m^2 c) 1130 N/C.m^2 d) 4520 N/C.m^2

5-Two identical capacitors are hooked in parallel to an external circuit. Which of the following quantities must be the same for both capacitors?
I. the charge stored on the capacitor
II. the voltage across the capacitor
III. the capacitance of the capacitor
a) I only
b) II only
c) II and III only
d) I, II, and III

6- A 2-μF capacitor is connected directly to a battery. When the capacitor is fully charged, it stores 600μC of charge. If the 2-μF capacitor is then replaced by four 18-μF capacitors in series connected to the same battery. Once the capacitors are fully charged, what charge is stored on each capacitor?
a) 200 μC b) 1350 μC c) 600 μC d)1800 μC

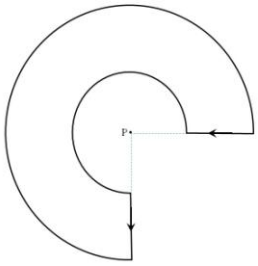
7- A 2-μF capacitor is connected to a 2100 volt battery through a 700 kΩ resistance. If the circuit is closed at t=0, what time is needed for the current to drop to half its initial value?
a) 1.4 sec. b) 0.97 sec. c) 3 sec. d) 2.8 sec.

8- Two bulbs marked 200 watt-250 volts and 100 watt-250 volts are joined in series to 250 volts supply. The power consumed in circuit is:
a) 67 watt b) 33 watt c) 100 watt d) 300 watt.

9- Which of the following statements about electric and magnetic fields is **FALSE**:
a) A charge moving along the direction of an electric field will experience a force, but a charge moving along the direction of a magnetic field will not experience a force.
b) All charges experience a force in an electric field, but only moving charges can experience a force in a magnetic field.
c) A positive charge moves in the direction of an electric field; a positive charge moves perpendicular to a magnetic field.
d) All moving charges experience a force parallel to an electric field and perpendicular to a magnetic field.

10- The magnitude of the magnetic field at a distance of 5 cm from a current carrying wire is 1.2T. What is the magnitude of the magnetic field at a distance of 3 cm from the same wire?
a) 2T b) 1.2T c) 0.72T d) 18T

11- In the figure shown, the current is 20 A in the indicated direction, the radius of the larger loop is 8 cm and the radius of the smaller loop is 5 cm. calculate the net magnetic field



at point P shown.
a) 3.06 G out of the page
b) 3.06 G into the page
c) 0.71 G out of the page
d) 0.71 G into the page

12- A proton moving with a velocity of $4x10^4$ m/s along the +y axis enters a magnetic field of 0.2T directed towards the –x axis. What is the magnetic force acting on the proton?
a) $3.89x10^{-15}$ N (+z) b) $3.89x10^{-15}$ N (-z)
c) $1.28x10^{-15}$ N (+z) d) $1.28x10^{-15}$ N (-z)

13) An object is situated between a concave mirror's surface and its focal point. The image formed in this case is:
a) virtual, reduced, and upright. b) real, enlarged, and inverted.
d) real, reduced, and inverted. c) virtual, enlarged and upright.

14) A convex spherical mirror has a focal length of -20 cm. An object is placed 10 cm in front of the mirror on the mirror's axis. Where is the image located?
a) 20 cm behind the mirror b) 6.7 cm behind the mirror
c) 6.7 cm in front of the mirror d) 20 cm in front of the mirror

15) If a material has an index of refraction of 1.50, what is the speed of light through it?

a) $6\times10^8\,\frac{m}{s}$ b) $4.5\times10^8\,\frac{m}{s}$ c) $3\times10^8\,\frac{m}{s}$ d) $2\times10^8\,\frac{m}{s}$

16) A ray of light, which is traveling in air, is incident on a glass plate at 45^o angle. The angle of refraction of the light ray in the glass is:

a) equal to 45^o b) greater than 45^o c) less than 45^o
d) could be any of the above; it all depends on the index of refraction of glass.

17) glass has an index of refraction of 1.50. What is its critical angle of incidence when light passes from glass into air?
a) 41.8^o b) 1.16^o c) 87.4^o d) 15^o
18) A single convex spherical mirror produces an image which is
a) always real.
b) real only if the object distance is greater than f.
c) real only if the object distance is less than f.
d) always virtual.
19) An object is placed at 30 cm in front of a diverging lens with a focal length of 10 cm. What is the magnification?
a) -0.25 b) 0.25 c) -0.67 d) 0.6720) If the magnification of the image of an object is 0.34 , then the image in this case is:a) real, inverted, and enlarged. b) virtual, upright and reduced.
d) real, upright, and reduced. c) virtual, inverted and reduced.