This exam consists of 23 multiple choice questions. Choose the answer that BEST satisfies the conditions imparted in the question. DO NOT rely on this exam as your sole resource in preparing for the real exam.

(1) When charging a neutral pith ball through contact with a negatively charged rod, what is the resulting charge on each:
(a) ball becomes negative, rod becomes positive
(b) ball becomes positive, rod becomes negative
(c) both the ball and rod end up with a negative charge
(d) both the ball and rod end up with a positive charge

(2) Which of the following methods of charging results in the two objects having different signs on their charges:
(a) contact
(b) induction
(c) rubbing
(d) all the above
(e) more than one but not all the above

(3) Two charges are initially separated by a certain distance. If this distance is tripled, then by what factor does the electric force increase or decrease [hint: use Coulomb’s law]:
(a) force decreases by a factor of 3
(b) force increases by a factor of 3
(c) force increases by a factor of 9
(d) force increases by a factor of 9
(e) force is not dependent on distance and will thus not change

(4) Which of the following substances would be considered a good insulator or “dielectric:”
(a) copper
(b) iron
(c) salty water
(d) plastic

(5) What is the current of a circuit that has 3 V and 0.5 ohm of resistance?
(a) 3 A
(b) 6 A
(c) 9 A
(d) 12 A
(6) Refer to the following figure:
If the voltage supplied by the batter is equal to 12 volts, then what is voltage on each of the three resistors:

(a) 3 V  
(b) 4 V  
(c) 12 V 
(d) cannot be determined with the information given

(7) Refer to the following figure: If the current going through the resistor labeled “c” is 2 A, then what is the voltage through the resistor labeled “A:”

(a) 30 V  
(b) 300 V 
(c) 90 V  
(d) 100 V 

(8) Ted has a problem with the wiring in his room. Whenever the computer goes out, so does the rest of the electrical power in his room. Based on this information, what type of electrical circulation does he have in his room?
(a) Parallel 
(b) Series 
(c) Loop 
(d) Functional 
(e) a 50/50 combination of series and parallel

(9) The geographical north pole of the earth corresponds to which of the following poles that a compass would point in?
(a) North 
(b) South 
(c) North-East 
(d) South-West

(10) Choose the incorrect statement below:
(a) Electric charges produce electric fields around them
(b) an electric field causes a force on any charged object placed in it
(c) magnets produce magnetic fields
(d) an immobile magnet will induce an electric current into a coil
(e) all of the above are correct statements

(11) The picture to the right shows a physics student trying to apply the right hand rule on a wire which has an upright current passing through it. What does the direction of the curling of his fingers give?
(a) Electric Field
(b) Magnetic Field
(c) Electric Potential
(d) Electromagnetic field

(12) An object has a charge of +3 Coulombs. If it gains an excess of 4 electrons, then what is the resulting charge?
(a) – 1 C
(b) +1 C
(c) -7 C
(d)+7 C
(e) 0 C

(13) Michael Faraday’s law of electromagnetic induction states that an electric current can be produced by a:
(a) an existing magnetic field
(b) an increasing magnetic field
(c) a decreasing magnetic field
(d) all of the above
(e) more than one but not all of the above

(14) Assuming that you were able to induce a current into the coil shown below, which law would you use to find the DIRECTION of the induced current?

(a) Faraday’s Law
(b) Ampere’s Law
(c) Lenz’s Law
(d) Cavendish Law
(e) Coulomb’s Law

(15) Choose the incorrect statement from the choices below:
(a) A moving charge, electric current, or changing electric field induces a magnetic field
(b) a changing magnetic field induces an electric current
(c) the electric charge is the source of electric and magnetic fields
(d) All electromagnetic waves move at the speed of light
(e) all of the above are correct statements
(16) What type of wave is an electromagnetic wave?
(a) Longitudinal
(b) Transverse
(c) Mechanical
(d) Ripple
(e) none of the above

(17) Which of the following statements is TRUE of electromagnetic waves?
(a) They require a medium to propagate
(b) They cannot travel through a vacuum
(c) They are really two coupled waves: electric and magnetic
(d) the waves oscillate parallel to one another
(e) All electromagnetic waves travel at the speed of sound.

(18) A radio wave has a wavelength of $3.14 \times 10^6$ m. Which radio station would you be listening to if your car was picking up waves of this wavelength?
(a) 93.1
(b) 95.5
(c) 97.9
(d) Hot 102.7 blazin the best beats with Russ Par in the morning.
(e) 93.9

(19) Diffraction of light waves is caused by which effect?
(a) the reflection of light
(b) the transmission of light
(c) the bending of light
(d) the diffusion of light
(e) the propagation of light

(20) Which of the following effects of light explains the phenomenon that when you place a pencil in a cup of water the pencil seems to bend?
(a) polarization of light
(b) interference of light
(c) reflection of light
(d) Refraction of light

(21) Light enters from air into diamond. Will the light bend toward or away from the normal?
(a) Towards
(b) Away

(22) When dealing with relativistic effects, which of the following combination is true?
(a) Time is relative, Distance is absolute
(b) Time is absolute, Distance is relative
(c) Time and Distance are both relative quantities
(d) Time and distance are both absolute quantities

(23) Which of the following postulates are indicative of Einstein’s theory of special relativity?
(a) All inertial frames of reference are acceptable for the description of physical phenomena
(b) The speed of light in a vacuum is the same for all observers
(c) The speed of light in a vacuum is independent of the motion of the source
(d) (a) and (b) only
(e) all of the above