Sarajevo School of Science and Technology

Sarajevo, 7 June 2014

Entrance Exam

P H Y S I C S

Name: _____

Circle the correct answer.

1. A flowerpot falls off the ledge of a fifth-floor window. Just as it passes the third-floor window someone accidentally drops a glass of water from that window. Which of the following statements is true?

   a) The flowerpot hits the ground first and with a higher speed than the glass.

   b) The flowerpot hits the ground at the same time as the glass, but the speed of flowerspot is grater.

   c) The flowerpot and the glass hit the ground at the same instant and with the same speed.

   d) The glass hits the ground before the flowerpot.

2. A ball is thrown upward. After it has left the hand, its acceleration

   a) is zero.

   b) increases.

   c) decreases.

   d) remains constant.

3. Which of the following statements describing an object in equilibrium is NOT true?

a) The vector sum of all the forces acting on the body is zero.

b) The body is moving at constant speed.

c) The body must be at rest.

d) The body is moving at constant velocity.

4. The force required to keep an object in motion at constant velocity is

a) zero.

b) proportional to its mass.

c) proportional to its weight.

d) proportional to its speed.

5. A car of mass M traveling with velocity *v* strikes a car of mass *M* that is at rest. The two cars' bodies mesh in the collision. The loss of the kinetic energy the moving car undergo in the collision is

a) a quarter of the initial kinetic energy.
b) half of the initial kinetic energy.
c) all the initial kinetic energy.
d) zero.

6. An astronaut on a strange planet with no atmosphere measures the acceleration of gravity at its surface and finds that it is 6 m/s^2. What explanation could account for this observation?

a) The mass of the planet is the same as that of Earth, but its radius is smaller than that of Earth.
b) The mass of the planet is smaller that of Earth and its radius is the same as that of Earth.
c) The astronaut's watch is running more slowly than it should.
d) Either b) or c) could account for the observation.

7. A cube 10 cm on edge is immersed in water. The pressure is greatest against

a) sides of the cube.

b) the bottom of the cube.

c) the top of the cube.

d) None of the above; the pressure is the same on all six sides.

8. If the surface temperature of the sun were to drop by a factor of 2, the radiant energy impinging on Earth per second would be reduced by factor of

a) 2 b) 4 c) 8 d) 16

9. If both the temperature and the volume of an ideal gas are doubled, the pressure

a) remains unchanged.

b) is also doubled.

c) increases by a factor of 4.

d) increases by a factor of 1/4.

10. If a system is subjected to an isohoric process,

a) the entropy of the systam remains constant

b) the internal energy of the system remains constant

c) no mechanical work is done by the system

d) the pressure of the system remains constant.

11. If the length of a pendulum is doubled, its frequency of oscillation is changed by a factor of

a) 2; b) √2 ; c) 1/√2 ; d) ¼

12. Which of the following statements is true?

a) A positive charge experiences an attractive electrostatic force toward a nearby neutral isolator.

b) A positive charge experiences no electrostatic force near a neutral insulator.

c) A positive charge experiences a repulsive force, away from a nearby neutral insulator.

d) Whatever the force on a positive charge near a neutral insulator, the force on a negative charge is then oppositely directed.

13. A ray of light passes from air into water, striking the surface of the water with an angle of incidence of 45^0. Which of the following four quantities change as the light enters the water? (I) Wavelength, (II) Frequency, (III) Speed of propagation, (IV) Direction of propagation.

a) I and II only.

b) II, III, and IV only.

c) I, III, and IV only.

d) III and IV only.

e) I, II, III, and IV.

14. The wavelength region to which the human eye is sensitive falls in the range of

a) 10 – 50 nm

b) 400 – 800 nm

c) 2000 – 4000 nm

d) 20.000 – 50.000 nm

e) None of the above.

15. An object is placed at a distance of *1.5f* from a converging lens of focal length *f* m. The image formed by this lens is

a) virtual, erect, and larger than the object.

b) virtual, erect, and smaller than the object.

c) real, inverted, and larger than the object.

d) real, inverted, and smaller than the object.

e) Real, inverted, and of the same size as the object.

16. If a real object is placed just inside the focal point of a diverging lens, the image is

a) virtual, erect, and diminished.

b) real, inverted, and enlarged.

c) real, inverted , and diminished.

d) virtual, erect, and enlarged.

e) virtual, inverted, and diminished.

17. A proton and an electron are traveling at the same velocity. The proton has a wavelength

a) grater than that of the electron.

b) less than that of the electron.

c) the same of that of the electron.

18. The number of the electrons that can be accomodated in the n = 4 shell is

a) 8 ; b) 18 ; c) 32 ; d) 36 ; e) infinite

19. A sample contains atoms of a radioactive isotpe whose half-life is 30 s. The number of disintegrations from this sample

a) depends on the total mass of the sample.

b) depends on the number of desintegrations that have already taken place.

c) depends on the number of radioactive nuclei present.

d) depends on the energy of the emitted particles.

e) depends on both c) and d).

20. The nucleus $_{53}I^{131}$ has

a) 53 protons and 131 neutrons.

b) 131 protons and 53 neutrons.

c) 78 protons and 53 neutrons.

d) 53 protons and 78 neutrons.

e) 78 protons and 131 neutrons.