PHYSICS

1. As a rock of mass 2 kg drops from the edge of a 20-meter-high cliff, it experiences air resistance, whose average strength during the descent is 15 N . At what speed will the rock hit the ground?
   A) 14m/s B) 100m/s C) 10m/s D) 1m/s

2. What is the wavelength of an X-ray whose frequency is 0, 8×10^{18} Hz?
   A)3, 75×10^{-9} m
   B)3, 75×10^{-11} m
   C)3, 75×10^{-10} m
   D)3, 75×10^{-8} m

3. The mass of the earth is 5, $97 \cdot 10^{24}$kg and its radius is 6370 km. The radius of the moon is 1738 km. The acceleration of gravity at the surface of the moon is 1,62 m/s^2. What is the ratio of the average density of the moon to that of the earth?
   A) 0,530 B) 0,206 C) 0,332 D) 0,605

4. If a lightbulb operates with 200 Ohm resistance, at a voltage of 120 V, what is the power of the bulb?
   A) 720 watt B) 240 watt C) 150 watt D) 72 watt

5. A 120 V ac voltage source is connected across a pure 0,7 H inductor. The frequency of the source is 60 Hz. What is the power loss in the inductor(W)?
   A) 0,3 B) 0,1 C) 0 D) 3

6. A box with a mass of 3 kg accelerates in a straight line from 10 m/s to 15 m/s due to the application of a force whose duration is 2 s. Find the average strength of this force.
   A) 15N B) 22.5N C) 7.5N D) 3.75N

7. Compute the energy(eV) of a photon of blue light of wavelength 450 nm.
   A) 2,76 B) 1,6 C) 5 D) 3,21

8. Two objects, one of mass 4 kg and moving with a speed of 1.5 m/s and the other of mass 6 kg and speed 3 m/s, move toward each other and collide head-on. If the collision is perfectly inelastic, find the speed of the objects after the collision.
   A) 0.5 m/s B) 0.75 m/s C) 0.25 m/s D) 1.2 m/s

9. A pickup truck with mass of 1230 kg moving at 108 km/h stops within a distance of 45.0 m. What is the direction and size of the force that acts on the truck?
   A) F = 12300N B) F = 1230N C) F = −1230N
   D) F = −12300N

10. Ordinary nitrogen gas consists of molecules of N_2. Find the mass(kg) of one such molecule. The molecular mass is 28 kg/kmol.
    A)2, $8 \cdot 10^{-26}$
    B)3, $3 \cdot 10^{-26}$
    C)4, $9 \cdot 10^{-26}$
    D)4, $7 \cdot 10^{-26}$

11. A rope of length 5 m is stretched to a tension of 80 N . If its mass is 1 kg, at what speed would a 10 Hz transverse wave travel down the string?
    A) 50 m/s B) 2 m/s C) 5 m/s D) 20 m/s

12. A 2000 kg car traveling to the right at 30 m/s is chasing a second car of the same mass that is traveling to the right at 10 m/s. If the two cars collide and stick together, what is their speed just after the collision(m/s)?
    A) 30 B) 18 C) 34 D) 20

13. A cathode ray beam (an electron beam; $m_E = 9,1 \cdot 10^{-31}$ kg, q=-e) is bent in a circle of radius 2 cm by a uniform field with B = $4,5 \cdot 10^{-3}$ T. What is the speed of the electrons(km/s)? e = $1,6 \cdot 10^{-19}$ C
    A) $1,8 \cdot 10^4$ B) $1,6 \cdot 10^4$ C) $3,2 \cdot 10^4$ D) $2 \cdot 10^4$

14. A satellite is currently orbiting Earth in a circular orbit of radius R; its kinetic energy is K. If the satellite is moved and enters a new circular orbit of radius 4R, what will be its kinetic energy?
    A) KB) 2K C) K/4 D) K/2

15. Through a series of thermodynamic processes, the internal energy of a sample of confined gas is increased by 480 J. If the net amount of work done on the sample by its surroundings is 130 J, how much heat was transferred between the gas and its environment?
    A) 610J absorbedB) 350 J absorbed
    C) 240 J absorbed D) 610 J dissipated

16. How much heat is required to raise the temperature of a 0.04 kg cast iron spoon from 20^0C to 50^0C if the specific heat of cast iron is 0, 46kJ/kg × ^{0}C ?
    A) 863J B) 234J C) 552J D) 441J

17. Two resistors, A and B, are in parallel in a circuit that carries a nonzero current. If the resistance of Resistor A is 4 times greater than the resistance of Resistor B, which of the following correctly compares the currents through these resistors (IA and IB, respectively) and the voltage drops across them (V A and V B, respectively)?
    A)IA = IB and V A = V B
    B)IA = IB and V A = 4V B
    C)IA = IB and V B = 4V A
    D)IB = 4IA and V B = V A

18. A force of 230 N is required to keep an object sliding at a constant speed of 3.5 m/s across a rough floor. How much power is being expended to maintain this motion?
    A) 400W B) 805W C) 65.7W D) 342W

19. A bat emits a 42 kHz “chirp” with a wavelength of 8 mm toward a tree and receives an echo 0.5 s later. How far is the bat from the tree?
    A) 168 m B) 42 m C) 84 m D) 140 m

20. A rock is dropped off a cliff and strikes the ground with an impact velocity of 30 m/s. How high was the cliff ?
    A) 30 m B) 45 m C) 20 m D) 60 m