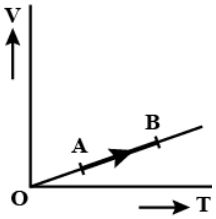
NEET 2018

(PHYSICS)

1. The volume (V) of a monoatomic gas varies with its temperature (T), as shown in the graph. The ratio of work done by gas, to the heat absorbed by it, when it undergoes a change from state A to state B, is



(a) 1/3 (b) 2/3 (c) 2/5 (d) 2/7

2. The fundamental frequency in an open organ pipe to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20cm, the length of the open organ pipe is
(a) 12.5cm (b) 8cm (c) 13.3cm (d) 16cm

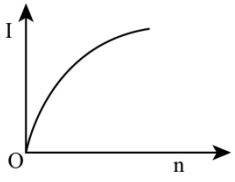
3. At what temperature will the rms speed of oxygen molecules become just sufficient for escaping from the Earth's atmosphere? (given: mass of oxygen molecule, $m = 2.76\times10^{-26}$ kg, Boltzmann's constant $k_B = 1.38\times10^{-23}$ JK^{-1})
(a) 5.016×10^4K (b) 8.326×10^4K (c) 2.508×10^4K (d) 1.254×10^4K

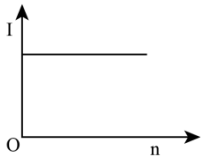
4. The efficiency of an ideal heat engine working between the freezing point and boiling point of water, is
(a) 6.25% (b) 20% (c) 26.8% (d) 12.5%

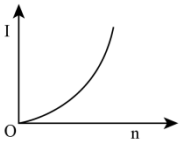
5. A carbon resistor of $(47\pm4.7)k\Omega$ is to be marked with rings of different colours for its identification. The colour code sequence will be
(a) Yellow-Green-Violet-Gold (b) Yellow-Violet-Orange-Silver
(c) Violet-Yellow-Orange-Silver (d) Green-Orange-Violet-Gold

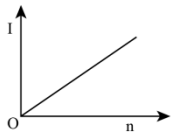
6. A set of 'n' equal resistors, of value 'R" each are connected in series to a battery of emf 'E' and internal resistance 'R". The current drawn is I. Now the 'n' resistors are connected in parallel to the same battery. Then, the current drawn from battery becomes 10I. The value of 'n' is
(a) 20 (b) 11 (c) 10 (d) 9

7. A battery consists of a variable number 'n' of identical cells (having internal resistance 'r' each) which are connected in series. The terminals of the battery are short circuited and the current I is measured. Which of the graphs shows the correct relationship between I and n?

(a) 

(b) 

(c) 

(d) 

8. Un-polarized light is incident from air on a plane surface of a material of refractive index 'μ'. At a particular angle of incidence 'i', it is found that the reflected and refracted rays are perpendicular to each other. Which of the following options is correct for this situation?
(a) $i = \sin^{-1}(1/\mu)$
(b) Reflected light is polarized with its electric vector perpendicular to the plane of incidence
(c) Reflected light is polarized with its electric vector parallel to the plane of incidence
(d) $i = \tan^{-1}(1/\mu)$

9. In Young's double slit experiment, the separation d between the slits is 2mm, the wavelength λ of the light used is 5896Å and distance D between the screen and slits is 100cm. Is it found that the angular width of the fringes is 0.20°. To increase the fringe angular width to 0.21° (with same λ and D) the separation between the slits needs to be changed to
(a) 2.1mm (b) 1.9mm (c) 1.8mm (d) 1.7mm

10. An astronomical refracting telescope will have large angular magnification and high angular resolution, when it has an objective lens of
(a) large focal length and large diameter (b) large focal length and small diameter
(c) small focal length and large diameter (d) small focal length and small diameter

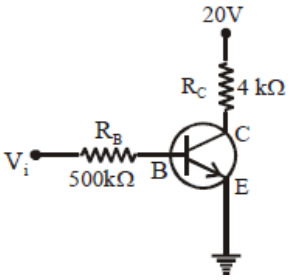
11. The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is
(a) 2: - 1 (b) 1: - 1 (c) 1:1 (d) 1: - 2

12. An electron of mass m with a velocity $v = v_0\hat{i}(v_0 > 0)$ enters an electric field $E = -E_0\hat{i}(E_0 = \text{constant} > 0)$ at t = 0. If λ_0 is its de-Broglie wavelength initially then its de-Broglie wavelength at time t is
(a) $\lambda_0 t$ (b) $\lambda_0\left(1+\frac{eE_0}{mv_0}t\right)$ (c) $\frac{\lambda_0}{\left(1+\frac{eE_0}{mv_0}t\right)}$ (d) λ_0

13. For a radioactive material, half life is 10 minutes. If initially there are 600 number of nuclei, the time taken (in minutes) for the disintegration of 450 nuclei is
(a) 30 (b) 10 (c) 20 (d) 15

14. When the light of frequency $2v_0$ (where v_0 is threshold frequency) is incident on a material plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5v_0$, the maximum velocity of electrons emitted from the same plate is v_2. The ratio of v_1 to v_2 is
(a) 4:1 (b) 1:4 (c) 1:2 (d) 2:1

15. In the circuit shown in the figure, the input voltage V_1 is 20V, V_{BE} = 0 and V_{CE} = 0. The values of I_B, I_C and β are



(a) I_B=20μA, I_C = 5mA, β = 250 (b) I_B=25μA, I_C = 5mA, β = 200

(c) I_B=40μA, I_C = 10mA, β = 250 (d) I_B=40μA, I_C = 5mA, β = 125

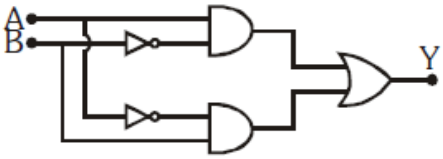
16. In a pn junction diode, change in temperature due to heating

(a) does not affect resistance of pn junction (b) affects only forward resistance

(c) affects only reverse resistance

(d) affects the overall VI characteristics of pn junction

17. In the combination of the following gates the output Y can be written in terms of inputs A and B as



(a) $\overline{A.B}+A.B$ (b) $A.\overline{B}+\overline{A}.B$ (c) $\overline{A.B}$ (d) $\overline{A+B}$

18. An EM wave is propagating in a medium with a velocity $v=v\hat{i}$. The instantaneous oscillating electric field of this EM wave is along +y axis. Then, the direction of oscillating magnetic field of EM wave will be along

(a) – y direction (b) +z direction (c) – z direction (d) – x direction

19. The refractive index of the material of a prism is √2 and the angle of prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is

(a) 30° (b) 45° (c) 60° (d) zero

20. An object is placed at a distance of 40cm from a concave mirror of focal length 15cm. If the object is displaced through a distance of 20cm towards the mirror, the displacement of the image will be

(a) 30cm towards the mirror (b) 36cm away from the mirror

(c) 30 cm away from the mirror (d) 36cm towards the mirror

21. The magnetic potential energy stored in a certain inductor is 25mJ, when the current in the inductor is 60mA. The inductor is of inductance

(a) 1.389H (b) 138.88H (c) 0.138H (d) 13.89H

22. An electron falls from rest through a vertical distance h in a uniform and vertically upward directed electric field E. The direction of electric field is now reversed, keeping its

magnitude the same. A proton is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall of the proton is

(a) 10 times greater (b) 5 times greater (c) smaller (d) equal

23. The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A is

(a) proportional to the square root of the distance between the plates

(b) linearly proportional to the distance between the plates

(c) independent of the distance between the plates

(d) inversely proportional to the distance between the plates

24. A tuning fork is used to produce resonance in a glass tube. The length of the air column in this tube can be adjusted by a variable piston. At room temperature of 27°C two successive resonances are produced at 20cm and 73cm of column length. If the frequency of the tuning fork is 320 Hz, the velocity of sound in air at 27°C is

(a) 350 m/s (b) 339 m/s (c) 330 m/s (d) 300 m/s

25. A pendulum is hung from the roof of a sufficiently high building and is moving freely to and fro like a simple harmonic oscillator. The acceleration of the bob of the pendulum is $20 m/s^2$ at a distance of 5m from the mean position. The time period of oscillation is

(a)2s (b) πs (c) 2πs (d) 1s

26. A metallic rod of mass per unit length 0.5 kg m^{-1} is lying horizontally on a smooth inclined plane which makes an angle of 30° with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction 0.25T is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is

(a) 14.76A (b) 5.98A (c) 7.14A (d) 11.32A

27. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnet is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence, the rod gains gravitational potential energy. The work required to do this comes from

(a) the lattice structure of the material of the rod

(b) the magnetic field (c) the current source

(d) the induced electric field due to the changing magnetic field

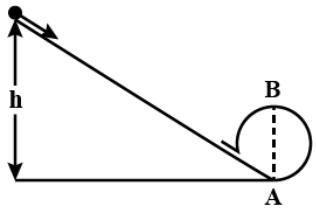
28. An inductor 20mH, a capacitor 100μF and a resistor 50Ω are connected in series across a source of emf, V = 10 sin 314t. The power loss in the circuit is

(a) 2.74W (b) 0.43W (c) 0.79W (d) 1.13W

29. Current sensitivity of a moving coil galvanometer is 5div/mA and its voltage sensitivity (angular deflection per unit voltage applied) is 20 div/V. The resistance of the galvanometer is

(a) 250Ω (b) 25 Ω (c) 40 Ω (d) 500 Ω

30. A body initially at rest and sliding along a frictionless track from a height h (as shown in the figure) just completes a vertical cycle of diameter AB = D. The height h is equal to



(a) 7/5D (b) D (c) 3/2D (d) 5/4D

31. Three objects A (a solid sphere), B (a thin circular disk) a C (a circular ring) each have same mass M and radius R. They all spin with same angular speed ω about their own symmetric axis. The amount of work (W) required to bring them to rest, would satisfy the relation

(a) $W_B > W_A > W_C$ (b) $W_A > W_B > W_C$ (c) $W_C > W_B > W_A$ (d) $W_A > W_C > W_B$

32. A moving block having mass m, collides with another stationary block having mass 4m. The lighter block comes to rest after collision. When the initial velocity of the lighter block is v, then the value of coefficient of restitution (e) will be

(a) 0.8 (b) 0.25 (c) 0.5 (d) 0.4

33. Which one of the following statements is incorrect?

(a) Frictional forces opposes the relative motion.

(b) Limiting value of static friction is directly proportional to normal reaction

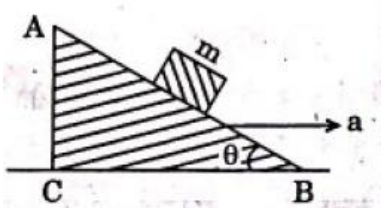
(c) Rolling friction is smaller than sliding friction.

(d) Coefficient of sliding friction has dimensions of length.

34. A toy car with charge q moves on a frictionless horizontal plane surface under the influence of uniform electric field **E**. Due to the force q**E** its velocity increases from 0 to 6m/s in one second duration. At that instant, the direction of field is reversed. The car continues to move two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively?

(a) 1m/s, 3.5m/s (b) 1m/s, 3m/s (c) 2m/s, 4m/s (d) 1.5m/s, 3m/s

35. A block of mass m is placed on a smooth inclined wedge ABC of inclination θ as shown in the figure. The wedge is given an acceleration a towards the right. The relation between a and θ for the block to remain stationary on the wedge is



(a) $a = g \cos\theta$ (b) $a = g/\sin\theta$ (c) $a = g/\text{cosec}\,\theta$ (d) $a = g \tan\theta$

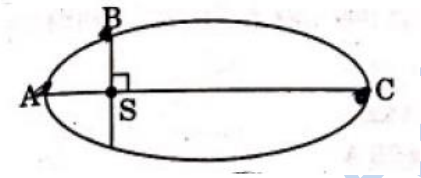
36. The moment of the force $\vec{F} = 4\hat{i} + 5\hat{j} - 6\hat{k}$ at (2, 0, - 3) about the point (2, - 2, - 2) is given by

(a) $-7\hat{i} - 8\hat{j} - 4\hat{k}$ (b) $-4\hat{i} - \hat{j} - 8\hat{k}$ (c) $-8\hat{i} - 4\hat{j} - 7\hat{k}$ (d) $-7\hat{i} - 4\hat{j} - 8\hat{k}$

37. A student measured the diameter of a small steel ball using a screw gauge of least count and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero count error of – 0.004cm, the correct diameter of the ball is
(a) 0.053cm (b) 0.525cm (c) 0.521cm (d) 0.529cm

38. A solid sphere is rotating freely about its symmetry axis in free space. The radius of the sphere is increased keeping its mass same. Which of the following physical quantities would remain constant for the sphere?
(a) rotational kinetic energy (b) moment of inertia
(c) angular velocity (d) angular momentum

39. The kinetic energies of a planet in an elliptical orbit about the sun, at positions A, B and C are K_A, K_B and K_C respectively. AC is the major axis and SB is perpendicular to AC at the position of the sun S as shown in the figure. Then



(a) $K_B<K_A<K_C$ (b) $K_A>K_B>K_C$ (c) $K_A<K_B<K_C$ (d) $K_B>K_A>K_C$

40. If the mass of the Sun were ten times smaller and the universal gravitational constant were ten times larger in magnitude, which of the following is nor correct?
(a) time period of a simple pendulum on the earth would decrease
(b) walking on the ground would become more difficult
(c) raindrops will fall faster (d) 'g' on the earth will not change

41. A solid sphere is in rolling motion. In rolling motion, a body possesses translational kinetic energy (K_t) as well as rotational kinetic energy (K_r) simultaneously. The ratio of K_t: (K_t + K_r) for the sphere is
(a)10:7 (b) 5:7 (c) 7:10 (d) 2:5

42. A small sphere of radius r falls from rest in a viscous liquid. As a result, heat produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity, is proportional to
(a) r^5 (b) r^2 (c) r^3 (d) r^4

43. The power radiated by a black body is P and it radiates maximum energy at wavelength, λ_0. If the temperature of the black body is now changed, so that it radiates maximum energy at wavelength 3/4 λ_0, the power radiated by it becomes np. The value of n is
(a) 256/81 (b) 4/3 (c) ¾ (d) 81/256

44. Two wires are made of the same material and have the same volume. The first wire has cross sectional area A and second wire has cross sectional area 3A. If the length of the first wire is increased by Δl on applying a force F, how much force is needed to stretched the second wire by the same amount?
(a) 4F (b) 6F (c) 9F (d) F

45. A sample of 0.1g of water at 100°C and normal pressure (1.013×10^5 Nm^{-2}) requires 54cal of heat energy to convert to steam at 100°C. If the volume of the steam produced is 167.1 cc, the change in internal energy of the sample is

(a) 42.2J (b) 208.7J (c) 104.3J (d) 84.5J