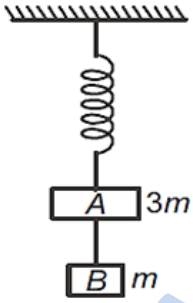
NEET 2017

(PHYSICS)

1. Two blocks A and B of masses 3m and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in the figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively.



(a) g, g/3 (b) g/3, g (c) g, g (d) g/3, g/3

2. The acceleration due to gravity at a height 1km above the earth is the same as at a depth d below the surface of earth. Then

(a) d = 1/2 km (b) d = 1 km (c) d = 3/2 km (d) d = 2 km

3. A particle executes linear simple harmonic motion with an amplitude of 3cm. When particle is at 2cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then, its time period in seconds is

(a) $\sqrt{5}/\pi$ (b) $\sqrt{5}/2\,\pi$ (c) $4\,\pi/\sqrt{5}$ (d) $2\,\pi/\sqrt{3}$

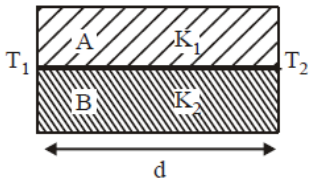
4. The resistance of a wire is R ohm. If it is melted and stretched to n times its original length, its new resistance will be

(a) nR (b) R/n (c) n^2R (d) R/n^2

5. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system.

(a) increases by a factor of 4 (b) decreases by a factor of 2
(c) remains the same (d) increases by a factor of 2

6. Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are K_1 and K_2. The thermal conductivity of the composite rod will be



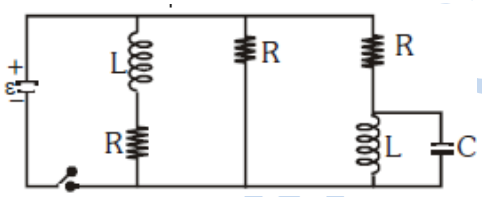
(a) $K_1+K_2/2$ (b) $3(K_1+K_2)/2$ (c) K_1+K_2 (d) $2(K_1+K_2)$

7. The two nearest harmonics of a tube closed at one end and open at other end are 220Hz and 260Hz. What is the fundamental frequency of the system?
(a) 10Hz (b) 20Hz (c) 30Hz (d) 40Hz

8. The bulk modulus of a spherical object is B. If it is subjected to uniform pressure o, the fractional decrease in radius is
(a) p/B (b) B/3p (c) 3p/B (d) p/3B

9. A physical quantity of the dimensions of length that can be formed out of c, G and $e^2/4\pi\varepsilon_0$ is [c is velocity of light, G is universal constant of gravitation and e is charge]
(a) $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$ (b) $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$ (c) $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{1/2}$ (d) $\frac{1}{c}G\frac{e^2}{4\pi\varepsilon_0}$

10. Figure shows a circuit that contains three identical resistors with resistance R = 9.0Ω each, two identical inductors with inductance L = 2.0mH and an ideal battery with emf ε = 18V. The current i through the battery just after the switch closed is



(a) 2mA (b) 0.2A (c) 2A (d) 0A

11. One end of the string of length l is connected to a particle of mass m and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed v, the net force on the particle (directed towards centre) will be (T represents the tension in the string)
(a) T (b) T +mv^2/l (c) T – mv^2/l (d) zero

12. The photoelectric threshold wavelength of silver is 3250×10^{-10}m. The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength 2536×10^{-10} m is (given h = 4.14×10^{-15} eVs and c = 3×10^8 ms^{-1})
(a) $\approx6\times10^5$ ms^{-1} (b) $\approx0.6\times10^6$ ms^{-1} (c) $\approx61\times10^3$ ms^{-1} (d) $\approx0.3\times10^6$ ms^{-1}

13. Radioactive material A has decay constant 8 λ and material B has decay constant λ. Initially they have same number of nuclei. After what time the ratio of number of nuclei of material B to that of A will be 1/e?
(a)1/ λ (b)1/7 λ (c)1/8 λ (d)1/9 λ

14. A rope is wound around a hollow cylinder of mass 3kg and radius 40cm. What is the angular acceleration of the cylinder, if the rope is pulled with a force of 30N?
(a) 25 m/s^2 (b) 0.25 rad/s^2 (c) 25 rad/s^2 (d) 5 m/s^2

15. Two cars moving in opposite directions approach each other with speed of 22 m/s and 16.5 m/s respectively. The driver of the first car blows a horn having a frequency 400ZHz. The frequency heard by the driver of the second car is [velocity of sound 340m/s]

(a) 350Hz (b) 361Hz (c) 411Hz (d) 448Hz

16. A 250 turn rectangular coil of length 2.1cm and width 1.25cm carries a current of 85 μA and subjected to a magnetic field of strength 0.85T. Work done for rotating the coil by 180° against the torque is

(a)9.1μJ (b) 4.55μJ (c) 2.3μJ (d) 1.5μJ

17. A long solenoid of diameter 0.1m has 2×10^4 turns per metre. At the centre of the solenoid, a coil of 100 turns and radius 0.01m is placed with its axis coinciding with the solenoid axis. The current in the solenoid reduced at a constant rate to 0A from 4A in 0.05s. If the resistance of the coil is 10 $\pi^2\Omega$, the total charge flowing through the coil during this time is

(a) 32 πμC (b) 15μC (c) 32μC (d) 16 πμC

18. Suppose the charge of a proton and an electron differ slightly. One of them is – e and the other is (e + Δe). if the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero, then Δe is of the order [Given mass of hydrogen, $m_h = 1.67\times10^{-27}$ kg]

(a) 10^{-20}C (b) 10^{-23}C (c) 10^{-37}C (d) 10^{-47}C

19. Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will

(a) keep floating at the same distance between them

(b) move towards each other (c) move away from each other

(d) will become stationary

20. The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is

(a) 2 (b) 1 (c) 4 (d) 0.5

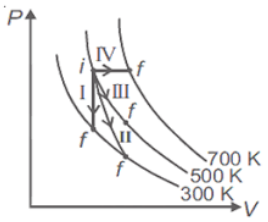
21. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T(Kelvin) and mass m is

(a) $\frac{h}{\sqrt{mkT}}$ (b) $\frac{h}{\sqrt{3mkT}}$ (c) $\frac{2h}{\sqrt{3mkT}}$ (d) $\frac{2h}{\sqrt{mkT}}$

22. A thin prism having refracting angle 10° is made of glass of refractive index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be

(a) 4° (b) 6° (c) 8° (d) 10°

23. Thermodynamics processes are indicated in the following diagram.



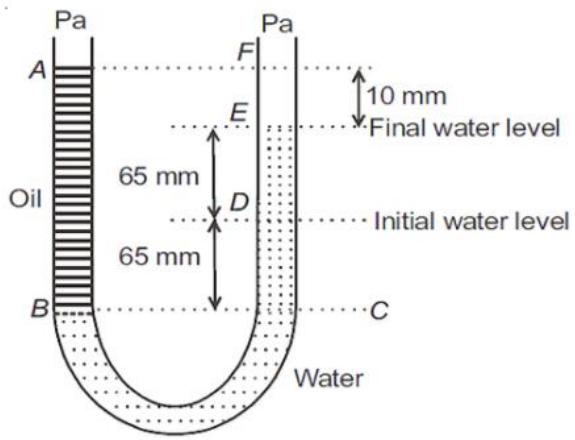
Match the following:

Column-I	Column-II
P. Process I	A. Adiabatic
Q. Process II	B. lsobaric
R. Process III	C. Isochoric
S. Process IV	D. Isothermal

(a) P → C, Q → A, R → D, S → B (b) P → C, Q → D, R → B, S → A

(c) P → D, Q → B, R → A, S → C (d) P→ A, Q → C, R → D, S → B

24. A U tube with both ends open to the atmosphere is partially filled with water, is poured into one side until it stands at a distance of 10mm above the water level on the other side. Meanwhile the water rises by 65mm from its original level (see diagram). The density of the oil is



(a) 650 kg m^{-3} (b) 425 kg m^{-3} (c) 800 kg m^{-3} (d) 928 kg m^{-3}

25. A spring of force constant k is cut into lengths of ratio 1:2:3. They are connected in series and the new force constant k'. If they are connected in parallel and force constant is k", then k': k" is

(a) 1:6 (b) 1:9 (c) 1:11 (d) 1:14

26. Which of the following statements are correct?

1. Centre of mass of a body always coincides with the centre of gravity of the body
2. Centre of mass of a body is the point at which the total gravitational torque on the body is zero
3. A couple on a body produce both translational and rotational motion in a body
4. Mechanical advantage greater than one means that small effort can be used to lift a large load

(a) 2 and 4 (b) 1 and 2 (c) 2 and 3 (d) 3 and 4

27. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle θ, the spot of the light is found to move through a distance y on the scale. The angle θ is given by

(a) y/2x (b) y/x (c) x/2y (d) x/y

28. A gas mixture consists of 2 moles of O_2 and 4 moles of Ar at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

(a) 4RT (b) 15RT (c) 9RT (d) 11RT

29. Consider a drop of rain water having mass 1g falling from a height of 1km. It hits the ground with a speed of 50m/s. Take g constant with a value of $10m/s^2$. The work done by the (i) gravitational force and the (ii) resistive force of air is

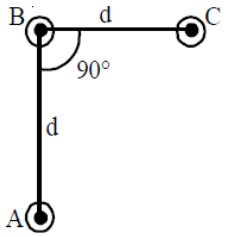
(a) (i) – 10J, (ii) – 8.25J (b) (i) 1.25J, (ii) – 8.25J

(c) (i) 100J, (ii) 8.75J (d) (i) 10J, (ii) – 8.75J

30. A Carnot engine having an efficiency of 1/10 as heat engine is used as a refrigerator. If the work done on the system is 10J, the amount of energy absorbed from the reservoir at lower temperature is

(a) 1J (b) 90J (c) 99J (d) 100J

31. An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current i along the same direction as shown in figure. Magnitude of force of per unit length on the middle wire is given by



(a) $\frac{\mu_0 i^2}{2\pi d}$ (b) $\frac{2\mu_0 i^2}{\pi d}$ (c) $\frac{\sqrt{2}\mu_0 i^2}{\pi d}$ (d) $\frac{\mu_0 i^2}{\sqrt{2}\pi d}$

32. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in metres and t in seconds. The acceleration of the particle at t = 2s is

(a) 0 (b) $5\ m/s^2$ (c) $-4\ m/s^2$ (d) $-8\ m/s^2$

33. The ratio of resolving powers of an optical microscope for two wavelengths $\lambda_1 = 4000Å$ and $\lambda_2 = 6000Å$ is

(a) 8:27 (b) 9:4 (c) 3:2 (d) 16:81

34. Preeti reached the metro station and found that the escalator is not working. She walked up the stationary escalator in time t_1. On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be

(a) $t_1 + t_2/2$ (b) $t_1.t_2/t_2 - t_1$ (c) $t_1.t_2/ t_2 + t_1$ (d) $t_1 - t_2$

35. A spherical black body with a radius of 12cm radiates 450 watt power at 500K. If the radius were halved and the temperature doubled, the power radiated in watt would be

(a) 225 (b) 450 (c) 1000 (d) 1600

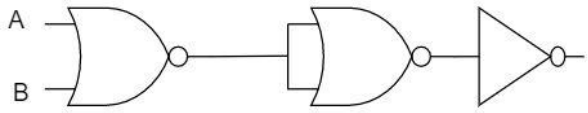
36. A potentiometer in an accurate and versatile device to make electrical measurement of EMF because the method involves

(a) cell (b) potential gradients

(c) a condition of no current flow through the galvanometer

(d) a combination of cells, galvanometer and resistances

37. The given electrical network is equivalent to



(a) AND gate (b) OR gate (c) NOR gate (d) NOT gate

38. In a common emitter transistor amplifier, the audio signal voltage across the collector is 3V. The resistance of collector is 3kΩ. If current gain is 100 and the base resistance is 2kΩ, the voltage and power gain of the amplifier is

(a) 200 and 1000 (b) 15 and 200 (c) 150 and 15000 (d0 20 and 2000

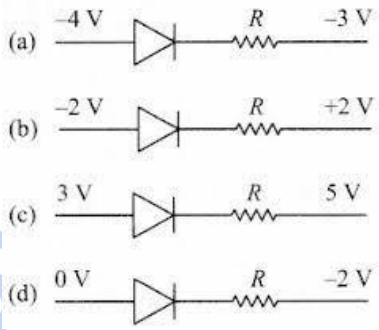
39. Two discs of same moment of inertia rotating about their regular axis passing though the centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2. They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is

(a) $1/2\ l\ (\omega_1 + \omega_2)^2$ (b) $1/4\ l\ (\omega_1 - \omega_2)^2$ (c) $l\ (\omega_1 - \omega_2)^2$ (d) $1/8\ l\ (\omega_1 - \omega_2)^2$

40. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8^{th} bright fringe in the medium lies where 5^{th} dark fringe lies in air. The refractive index of the medium is nearly

(a) 1.25 (b) 1.59 (c) 1.69 (d) 1.78

41. Which one of the following represents forward bias diode?



42. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarized light I_0 is incident on P_1. A third Polaroid P_3 is kept in between P_1 and P_2 such that its axis makes and angle 45° with that of P_1. The intensity of transmitted light through P_2 is

(a) $I_0/2$ (b) $I_0/4$ (c) $I_0/8$ (d) $I_0/16$

43. In an electromagnetic wave in free space the root mean square value of the electric field is E_{rms} = 6V/m. The peak value of the magnetic field is

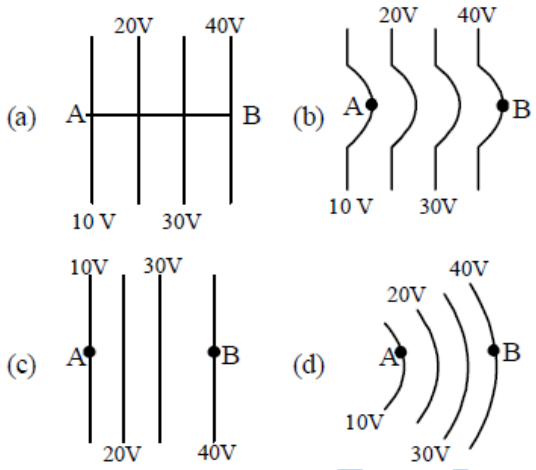
(a) 1.41×10^{-8}T (b) 2.83×10^{-8}T (c) 0.70×10^{-8}T (d) 4.23×10^{-8}T

44. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by

(a) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$ (b) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$

(c) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$ (d) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$

45. The diagrams below show regions of equipotentials



A positive charge is moved from A to B in each diagram

(a) Maximum work is required to move q in figure (c)

(b) In all four cases the work done is the same

(c) Minimum work is required to move q in figure (a)

(d) Maximum work is required to move q in figure (b)