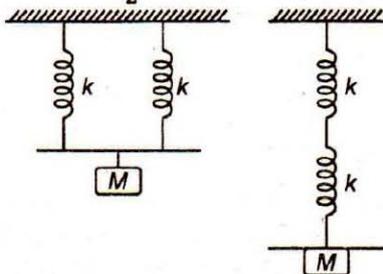
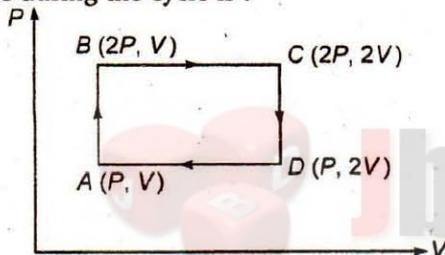


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- The height y and distance x along the horizontal plane of projectile on a certain planet (with no surrounding) are given by :
 $y = (8t - 5t^2)$ metre and $x = 6t$ metre
 where t is in second. The velocity with which the projectile is projected is :
 (a) 8 m/s (b) 6 m/s
 (c) 10 m/s (d) data is not sufficient
 - A body of mass a , moving with a velocity b collides with a body of mass c , at rest and sticks to it. They move together with a velocity given by :
 (a) $\frac{ac}{a+b}$ (b) $\frac{ab}{a+c}$
 (c) $\frac{a+b}{ac}$ (d) $\frac{b+c}{ab}$
 - The refractive index of a material is given by the equation $n = \frac{A+B}{\lambda^2}$, where A and B are constants. The dimensional formula for B is :
 (a) $[M^0L^2T^{-1}]$ (b) $[M^0L^{-2}T^0]$
 (c) $[M^0L^2T^{-2}]$ (d) $[M^0L^2T^0]$
 - A satellite is orbiting around the earth. By what percentage should we increase its velocity, so as to enable it escape away from the earth ?
 (a) 41.4% (b) 50%
 (c) 82.8% (d) 100%
 - At what temperature, the hydrogen molecule will escape from earth's surface ?
 (a) 10^1 K (b) 10^2 K
 (c) 10^3 K (d) 10^4 K
 - If the earth is at one-fourth of its present distance from the sun, the duration of the year will be :
 (a) half the present year
 (b) one-eighth the present year
 (c) one-fourth the present year
 (d) one-sixth the present year
 - An observer moves towards a stationary source of sound with a velocity one-tenth the velocity of sound. The apparent increase in frequency is :
 (a) zero (b) 10%
 (c) 5% (d) 0.1%
 - When two conductors of charges and potentials C_1, V_1 and C_2, V_2 respectively are joined, the common potential will be :
 (a) $\frac{C_1V_1 + C_2V_2}{V_1 + V_2}$ (b) $\frac{C_1V_1^2 + C_2V_2^2}{V_1^2 + V_2^2}$
 (c) $C_1 + C_2$ (d) $\frac{C_1V_1 + C_2V_2}{C_1 + C_2}$
 - A weightless thread can bear tension upto 3.7 kg-wt. A stone of mass 500 g is tied to it and revolved in a circular path of radius 4 m in a vertical plane. If $g = 10 \text{ ms}^{-2}$, then the maximum angular velocity of the stone will be :
 (a) 4 rad/s (b) 16 rad/s
 (c) $\sqrt{21}$ rad/s (d) 2 rad/s
 - The effective length of a magnet is 31.4 cm and its pole strength is 0.5 Am. If it is bent in the form of semicircle, what will be its magnetic moment then ?
 (a) 0.12 Am^2 (b) 0.1 Am^2
 (c) 0.05 Am^2 (d) 0.01 Am^2
 - Four molecules of a gas have speeds 1, 2, 3 and 4 kms^{-1} . The value of rms speed of the gas molecules is :
 (a) $\frac{1}{2}\sqrt{15} \text{ kms}^{-1}$ (b) $\frac{1}{2}\sqrt{10} \text{ kms}^{-1}$
 (c) 2.5 kms^{-1} (d) $\sqrt{\frac{15}{2}} \text{ kms}^{-1}$
 - If there is change of angular momentum from J to $5J$ in 5 s, then the torque is :
 (a) $\frac{3J}{5}$ (b) $\frac{4J}{5}$
 (c) $\frac{5J}{4}$ (d) none of these
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13. Two springs having force constants k each are arranged in parallel and in series. A mass M is attached to two arrangements separately. If time period in first case is T_1 and in second case is T_2 , then ratio $\frac{T_1}{T_2}$ is :



- (a) 1.5 (b) 3.2
(c) 0.5 (d) 2.1
14. If the work done in blowing a bubble of volume V is W , then the work done in blowing a soap bubble of volume $2V$ will be :
- (a) W (b) $2W$
(c) $\sqrt{2}W$ (d) $4^{1/3}W$
15. An ideal monoatomic gas is taken round the cycle $ABCD$ as shown in figure. The work done during the cycle is :

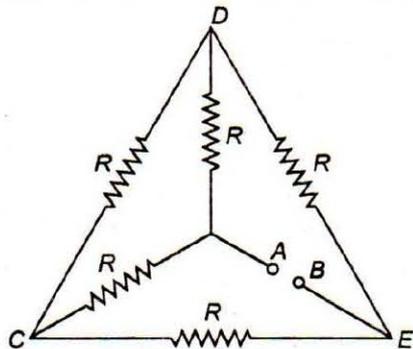


- (a) $\frac{PV}{2}$ (b) $2PV$
(c) $\frac{PV}{2}$ (d) zero
16. A proton of energy 2 MeV is moving in a circular path in a magnetic field. What should be the energy of a deuteron, so that it also describes circular path of radius equal to that of the proton ?
- (a) 1 MeV (b) 2 MeV
(c) 4 MeV (d) 0.5 MeV
17. A gas at NTP is suddenly compressed to one-fourth of its original volume. If γ is supposed to be $3/2$, then the final pressure is :
- (a) 4 atm (b) $\frac{3}{2}$ atm
(c) 8 atm (d) $\frac{1}{4}$ atm
18. In a series combination $R = 300 \Omega$, $L = 0.9 \text{ H}$, $C = 2.0 \mu\text{F}$, $\omega = 1000 \text{ rad/s}$, the impedance of the circuit is :

- (a) 1300Ω (b) 900Ω
(c) 500Ω (d) 400Ω
19. n identical spherical drops each of radius r are charged to same potential V . They combine to form a bigger drop. The potential of the big drop will be :
- (a) $n^{1/3}V$ (b) $n^{2/3}V$
(c) V (d) nV
20. The wavelength of maximum energy, released during an atomic explosion was $2.93 \times 10^{-10} \text{ m}$. Given that the Wien's constant is $2.93 \times 10^{-3} \text{ m-K}$, the maximum temperature attained must be of the order of :
- (a) 10^{-7} K (b) 10^7 K
(c) 10^{-3} K (d) $5.86 \times 10^7 \text{ K}$
21. The pressure and density of a diatomic gas ($\gamma = \frac{7}{5}$) change adiabatically from (P, d) to (P', d') . If $\frac{d'}{d} = 32$, then $\frac{P'}{P}$ should be :
- (a) $\frac{1}{128}$ (b) 32
(c) 128 (d) none of these
22. A piece of wax weighs 18.03 g in air. A piece of metal is found to weigh 17.03 g in water. It is tied to the wax and both together weigh 15.23 g in water. Then, the specific gravity of wax is :
- (a) $\frac{18.03}{17.03}$ (b) $\frac{17.03}{18.03}$
(c) $\frac{18.03}{19.83}$ (d) $\frac{15.03}{17.03}$
23. If a mica sheet of thickness t and refractive index μ is placed in the path of one of interfering beams in a double slit experiment, then displacement of fringes will be :
- (a) $\frac{D}{d}\mu t$ (b) $\frac{D}{d}(\mu - 1)t$
(c) $\frac{D}{d}(\mu + 1)t$ (d) $\frac{D}{d}(\mu^2 - 1)t$
24. A ray of light propagates from glass (refractive index = $\frac{3}{2}$) to water (refractive index = $\frac{4}{3}$). The value of the critical angle is :
- (a) $\sin^{-1}\left(\frac{1}{2}\right)$ (b) $\sin^{-1}\left(\sqrt{\frac{9}{8}}\right)$
(c) $\sin^{-1}\left(\frac{8}{9}\right)$ (d) $\sin^{-1}\left(\frac{5}{7}\right)$
25. A ray of light suffers minimum deviation when incident at 60° prism of refractive index $\sqrt{2}$. The angle of incidence is :

- (a) $\sin^{-1}(0.8)$ (b) 60°
 (c) 45° (d) 30°

26. Each of the resistance in the network shown in figure is equal to R . Find the equivalent resistance between two terminals A and B.



- (a) R (b) $5R$
 (c) $2R$ (d) $\frac{2}{3}R$

27. A gas in an air tight container is heated from 25°C to 90°C . The density of gas will :

- (a) increase slightly
 (b) remain the same
 (c) increase considerably
 (d) decrease slightly

28. If 2% of the main current is to be passed through the galvanometer of resistance G , the resistance of the shunt required is :

- (a) $\frac{G}{49}$ (b) $\frac{G}{50}$
 (c) $49G$ (d) $50G$

29. The current in self-inductance $L = 40 \text{ mH}$ is increased uniformly from 1 A to 11 A in 4 milliseconds . The induced emf produced in L during this process will be :

- (a) 100 V (b) 0.2 V
 (c) 440 V (d) 40 V

30. H^+ , He^{2+} and O^{2-} all having the same kinetic energy pass through a region in which there is a uniform magnetic field perpendicular to their velocity. The masses of H^+ , He^{2+} and O^{2-} are 1 amu , 4 amu and 16 amu , respectively. Then :

- (a) H^+ will be deflected most
 (b) O^{2-} will be deflected most
 (c) He^{2+} and O^{2-} will be deflected most
 (d) all will be deflected most

31. The current gain of a transistor in common emitter mode is 49 . The change in collector current and emitter current corresponding to the change in base current by $5.0 \mu\text{A}$ are :

- (a) $\Delta i_C = 245 \mu\text{A}$, $\Delta i_E = 250 \mu\text{A}$
 (b) $\Delta i_C = 252 \mu\text{A}$, $\Delta i_E = 145 \mu\text{A}$
 (c) $\Delta i_C = 125 \mu\text{A}$, $\Delta i_E = 250 \mu\text{A}$
 (d) $\Delta i_C = 252 \mu\text{A}$, $\Delta i_E = 230 \mu\text{A}$

32. In hydrogen atom when an electron jumps from second to first orbit, the wavelength of line emitted is :

- (a) 0.563 \AA (b) 4861 \AA
 (c) 4102 \AA (d) 1213 \AA

33. How does the magnetic susceptibility χ of a paramagnetic material change with absolute temperature T ?

- (a) $\chi \propto T$ (b) $\chi \propto T^{-1}$
 (c) $\chi = \text{constant}$ (d) $\chi \propto e^T$

34. Two identical heaters of 220 V , 1000 W are placed in parallel with each other across 220 V line, then the combined power is :

- (a) 1000 W (b) 2000 W
 (c) 500 W (d) 4000 W

35. A bar of magnetic moment M is cut into two parts of equal length. The magnetic moment of either part is :

- (a) M (b) $2M$
 (c) $\frac{M}{2}$ (d) zero

36. A rain drop of radius 0.3 mm has a terminal velocity of 1 m/s and the viscosity of air is $18 \times 10^{-5} \text{ poise}$. The viscous force on the drop is :

- (a) $16.95 \times 10^{-9} \text{ N}$ (b) $1.695 \times 10^{-9} \text{ N}$
 (c) $10.17 \times 10^{-9} \text{ N}$ (d) $101.74 \times 10^{-9} \text{ N}$

37. If magnetic material moves from stronger to weaker parts of magnetic field, then it is known as :

- (a) anti-ferromagnetic
 (b) ferromagnetic
 (c) diamagnetic
 (d) paramagnetic

38. A charge q is placed at the centre of line joining two equal charges Q . The system of three charges will be in equilibrium, if q is equal to :

- (a) $-\frac{Q}{2}$ (b) $-\frac{Q}{4}$
 (c) $+\frac{Q}{4}$ (d) $+\frac{Q}{2}$

39. The temperature of cold, hot junction of a thermocouple are 0°C and $T^\circ\text{C}$ respectively.

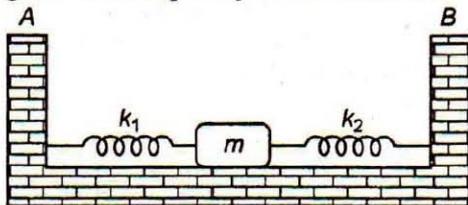
The thermo-emf produced is $E = AT - \frac{1}{2}BT^2$.

If $\Delta T = 0.03$, the temperature of

inversion will be :

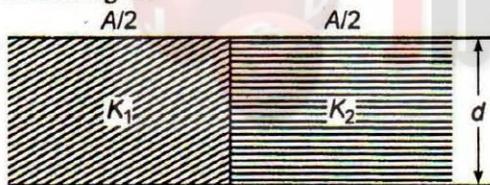
- (a) 100°C (b) 300°C
 (c) 400°C (d) 500°C

40. Two light springs of force constants k_1 and k_2 and a block of mass m are in one line AB on a smooth horizontal table, such that one end of each spring is fixed to rigid support and other end is attached to block of mass m kg as shown in figure. The frequency of vibration is :



- (a) $n = \frac{1}{2\pi} \sqrt{\frac{k_1 + k_2}{m}}$ (b) $n = \frac{1}{2\pi} \sqrt{\frac{k_1 k_2}{m}}$
 (c) $n = \frac{1}{2\pi} \sqrt{\frac{k_1 - k_2}{m}}$ (d) none of these

41. Pressure inside two soap bubbles are 1.01 and 1.02 atm. Ratio between their volumes is :
 (a) 102 : 101 (b) $(102)^3 : (103)^3$
 (c) 8 : 1 (d) 2 : 1
42. Two dielectrics of dielectric constants K_1 and K_2 are filled in gap of parallel plate capacitor as shown in figure



The capacitance of capacitor will be :

- (a) $\frac{\epsilon_0 A (K_1 + K_2)}{2d}$ (b) $\frac{\epsilon_0 A}{2d} \left(\frac{K_1 + K_2}{K_1 K_2} \right)$
 (c) $\frac{\epsilon_0}{d} \left(\frac{K_1 K_2}{K_1 + K_2} \right)$ (d) $\frac{\epsilon_0 A}{d} \left(\frac{K_1 + K_2}{K_1 K_2} \right)$
43. For a series LCR circuit, the phase difference between current and voltage at the condition of resonance will be :
 (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$
 (c) zero (d) nothing can be said
44. A metallic rod of length l is placed normal to the magnetic field B and revolved in a circular path about one of the ends with angular frequency ω . The potential difference across

- (a) $\frac{1}{2} B^2 l \omega$ (b) $\frac{1}{2} B \omega l^2$
 (c) $\frac{1}{8} B \omega l^3$ (d) $B \omega l^2$

45. A magnetic needle suspended in a vertical plane at 30° from the magnetic meridian makes an angle 45° with the horizontal. What will be the true angle of dip ?

- (a) $\tan^{-1} \left(\frac{\sqrt{3}}{2} \right)$ (b) $\tan^{-1}(\sqrt{3})$
 (c) 45° (d) 30°

46. A force F is given by $F = at + bt^2$, where t is time. What are the dimensions of a and b respectively ?

- (a) $[MLT^{-1}]$ and $[MLT^{-4}]$
 (b) $[MLT^{-3}]$ and $[MLT^{-4}]$
 (c) $[MLT^{-4}]$ and $[MLT^2]$
 (d) $[ML^2T^3]$ and $[M^{-1}L^2T]$

47. In a triode valve, the plate resistance is 10000Ω and the anode load resistance is 30000Ω . If the amplification factor is 36, then the voltage gain is :

- (a) 9 (b) 27
 (c) 36 (d) 108

48. g_e and g_p denote the acceleration due to gravity on the surface of the earth and another planet whose mass and radius are twice to that of the earth, then :

- (a) $g_p = \frac{g_e}{2}$ (b) $g_p = g_e$
 (c) $g_p = 2g_e$ (d) $g_p = \frac{g_e}{\sqrt{2}}$

49. Of the following which relation is true :

- (a) $\beta > \alpha$ (b) $\alpha > \beta$
 (c) $\alpha\beta = 1$ (d) $\alpha = \beta$

50. A soap bubble in vacuum has a radius 3 cm and another soap bubble in vacuum has radius 4 cm. If two bubbles coalesce under isothermal condition, then the radius of the new bubble will be :

- (a) 7 cm (b) 5 cm
 (c) 4.5 cm (d) 2.3 cm

Answer – Key

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1.	c	2.	b	3.	d	4.	a	5.	d	6.	b	7.	b	8.	d	9.	a	10.	b
11.	d	12.	b	13.	c	14.	d	15.	a	16.	a	17.	c	18.	c	19.	b	20.	b
21.	c	22.	c	23.	b	24.	c	25.	c	26.	a	27.	d	28.	a	29.	a	30.	a
31.	a	32.	d	33.	b	34.	b	35.	c	36.	d	37.	c	38.	b	39.	c	40.	a
41.	c	42.	a	43.	c	44.	b	45.	a	46.	b	47.	b	48.	a	49.	a	50.	b

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