1. The difference between the apparent frequency of a source of sound as perceived by the observer during its approach and recession is 2% of the frequency of the source. If the speed of sound in air is 300 ms^{-1}, the velocity of the source is
(a) 1.5 ms^{-1} (b) 12 ms^{-1}
(c) 6 ms^{-1} (d) 3 ms^{-1}

2. Three long straight wires A, B and C are carrying currents as shown in figure. Then, the resultant force on B is directed

(a) perpendicular to the plane of paper and outward
(b) perpendicular to the plane of paper and inward
(c) towards A
(d) towards C
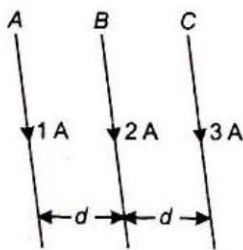
3. Curie-Weiss law is obeyed by iron
(a) at Curie temperature only
(b) at all temperatures
(c) below Curie temperature
(d) above Curie temperature

4. A magnet N-S is suspended from a spring and when it oscillates, the magnet moves in and out of the coil C. The coil is connected to a galvanometer G. Then, as the magnet oscillates

(a) G shows no deflection
(b) G shows deflection to the left and right but the amplitude steadily decreases
(c) G shows deflection to the left and right with constant amplitude
(d) G shows deflection on one side

5. The dimensional formula for inductance is
(a) $[ML^2T^{-2}A^{-2}]$ (b) $[ML^2TA^{-2}]$
(c) $[ML^2T^{-1}A^{-2}]$ (d) $[ML^2T^{-2}A^{-1}]$

6. The maximum current that can be measured by a galvanometer of resistance 40 Ω is 10 mA. It is converted into a voltmeter that can read upto 50 V. The resistance to be connected in series with the galvanometer (in ohm) is
(a) 2010   (b) 4050
(c) 5040   (d) 4960

7. When a body falls in air, the resistance of air depends to a great extent on the shape of the body. 3 different shapes are given. Identify the combination of air resistances which truly represents the physical situation?
(The cross-sectional areas are the same).
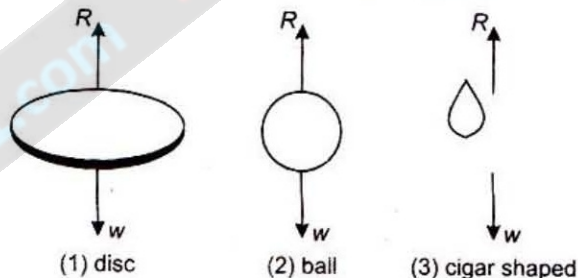
(1) disc   (2) ball   (3) cigar shaped

(a) 1 < 2 < 3   (b) 2 < 3 < 1
(c) 3 < 2 < 1   (d) 3 < 1 < 2

8. Heavy water is
(a) compound of deuterium and oxygen
(b) water at 4°C
(c) water, in which soap does not lather
(d) compound of heavy oxygen and heavy hydrogen

9. A bullet moving with a speed of 100 ms^{-1} can just penetrate two planks of equal thickness. Then, the number of such planks penetrated by the same bullet when the speed is doubled will be
(a) 6   (b) 10
(c) 4   (d) 8

(a)   (b)   (c)   (d)
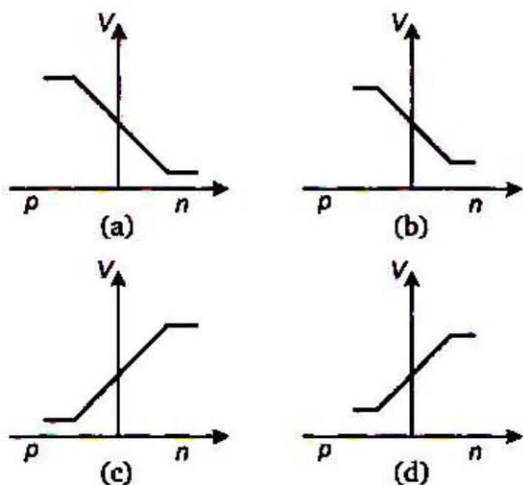
**21.** From the adjacent figure, the correct observation is
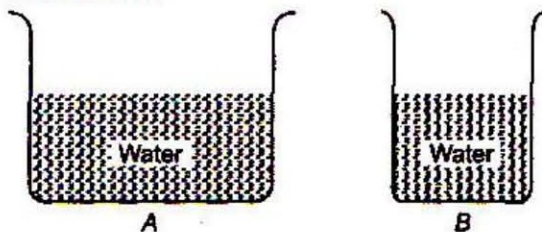
(a) the pressure on the bottom of tank A is greater than at the bottom of B

(b) the pressure on the bottom of tank A is smaller than at the bottom of B

(c) the pressure depends on the shape of the container

(d) the pressure on the bottom of A and B is the same

22. Two electric bulbs A and B are rated as 60 W and 100 W. They are connected in parallel to the same source. Then

(a) B draws more current than A

(b) currents drawn are in the ratio of their resistances

(c) both draw the same current

(d) A draws more current than B

23. A thin plano-convex lens acts like a concave mirror of focal length 0.2 m when silvered from its plane surface. The refractive index of the material of the lens is 1.5. The radius of curvature of the convex surface of the lens will be

(a) 0.1 m   (b) 0.75 m

(c) 0.4 m   (d) 0.2 m

**24.** A balloon is rising vertically up with a velocity of 29 ms^{-1}. A stone is dropped from it and it reaches the ground in 10 s. The height of the balloon when the stone was dropped from it is $(g = 9.8 \text{ ms}^{-1})$

(a) 400 m   (b) 150 m

(c) 100 m   (d) 200 m

25. In a Young's double slit experiment, the separation between the two slits is 0.9 mm and the fringes are observed 1 m away. If it produces the second dark fringe at a distance of 1 mm from the central fringe, the wavelength of the monochromatic source of light used is

(a) 450 nm   (b) 400 nm

(c) 500 nm   (d) 600 nm

26. H-polaroid is prepared by

(a) orienting herapathite crystal in the same direction in nitrocellulose

(b) using thin tourmaline crystals

(c) stretching polyvinyl alcohol and then heated with dehydrating agent

(d) stretching polyvinyl alcohol and then impregnating with iodine

27. A spherical drop of capacitance 1 μF is broken into eight drops of equal radius. Then, the capacitance of each small drop is

(a) $\frac{1}{2}\mu F$ (b) $\frac{1}{4}\mu F$

(c) $\frac{1}{8}\mu F$ (d) $8\mu F$

28. Identify the wrong description of the below figures.

(a) 1 represents far-sightedness

(b) 2 correction for short-sightedness

(c) 3 represents far-sightedness

(d) 4 correction for far-sightedness

29. Threshold wavelength for photoelectric emission from a metal surface is 5200 Å. Photoelectrons will emitted when this surface is illuminated with monochromatic radiation from

(a) 1W IR lamp   (b) 50W UV lamp

(c) 50W IR lamp   (d) 10W IR lamp

30. The electric flux for Gaussian surface A that enclose the charged particles in free space is
(Given $q_1 = -14$ nC, $q_2 = 78.85$ nC, $q_3 = -56$ nC)
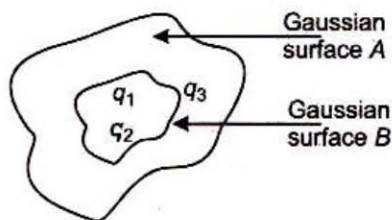
(a) $10^3 \text{Nm}^2 \text{C}^{-1}$

(b) $10^3 \text{CN}^{-1}\text{m}^{-2}$

(c) $6.32 \times 10^3 \text{ Nm}^2 \text{C}^{-1}$

(d) $6.32 \times 10^3 \text{ CN}^{-1}\text{m}^{-1}$

31. Which state of triply ionised beryllium (Be^{3+}) has the same orbital radius as that of the ground state of hydrogen ?
(a) $n = 3$ (b) $n = 4$
(c) $n = 1$ (d) $n = 2$

32. If M is the atomic mass and A is the mass number, packing fraction is given by
(a) $\dfrac{M}{M - A}$ (b) $\dfrac{M - A}{A}$
(c) $\dfrac{A}{M - A}$ (d) $\dfrac{A - M}{A}$

33. A count rate meter shows a count of 240/min from a given radioactive source after in the meter shows a count rate of 30/min. The half-life of the source is
(a) 80 min   (b) 120 min
(c) 20 min   (d) 30 min

34. An uncharged sphere of metal is placed inside a charged parallel plate capacitor. The lines of force will look like
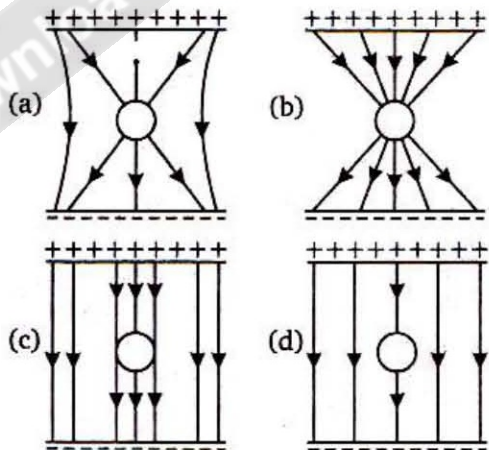

35. A current flows in a conductor from east to west. The direction of the magnetic field at a point above the conductor is
(a) towards east
(b) towards west
(c) towards north
(d) towards south

36. Excitation energy of a hydrogen like in its first excitation state is 40.8 eV. Energy needed to remove the electron from the ion in ground state is
(a) 40.8 eV   (b) 27.2 eV
(c) 54.4 eV   (d) 13.6 eV

37. An ideal gas heat engine operates in a Carnot's cycle between 227°C and 127°C. It absorbs 6×10^4 J at high temperature. The amount of heat converted into work is
(a) 1.6×10^4 J   (b) 1.2×10^4 J
(c) 4.8×10^4 J   (d) 3.5×10^4 J

38. Which one of the following graphs represents the behaviour of an ideal gas ?
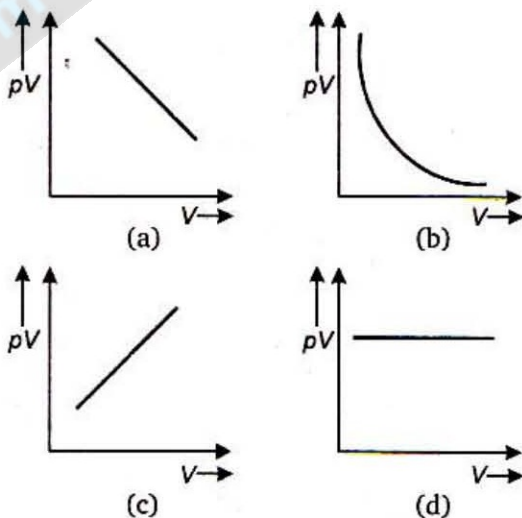
39. A beam of parallel rays is brought to focus by a plano-convex lens. A thin concave lens of the same focal length is joined to the first lens. The effect of this is
(a) the focus shifts to infinity
(b) the focal point shifts towards the lens by a small distance
(c) the focal point shifts away from the lens by a small distance
(d) the focus remains undisturbed

40. Effective capacitance between A and B in the figure, shown is
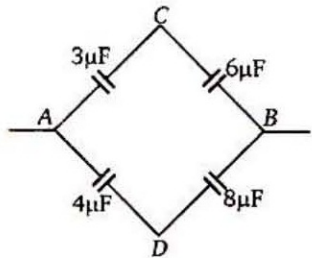
(a) $\dfrac{3}{14} \mu F$

(b) $\dfrac{14}{3} \mu F$

(c) $21 \mu F$

(d) $23 \mu F$

Answer – Key

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