1. In the relation $V = V = \frac{\pi pr^4}{8\eta l}$ where the symbols have their usual meanings, the dimensions of V are

(a) $[M^0L^3T^0]$ (b) $[M^0L^3T^{-1}]$
(c) $[M^0L^{-3}T]$ (d) $[ML^3T^0]$

2. A point moves such that its displacement as a function of time is given by $x^2 = t^2 + 1$. Its acceleration at time *t* is

(a) $\frac{1}{x^4}$ (b) $\frac{t}{x^2}$
(c) $\frac{t}{x} - \frac{t^2}{x^3}$ (d) $\frac{1}{x} - \frac{t}{x^2}$

3. The angle of projection for which the horizontal range and the maximum height of the projectile are equal is

(a) 45° (b) $\theta = \tan^{-1}(4)$
(c) $\theta = \tan^{-1}(0.25)$ (d) none of these

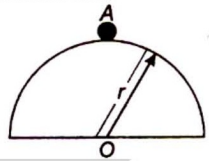
4. A body of mass 10 kg falls from a height of 5 m (g = 10 m/s) and is stopped within one-tenth of a second on the ground. The force of interaction is

(a) 100 N (b) zero
(c) 1000 N (d) 1100N

5. Two bodies, having masses in the ratio 1:4, have kinetic energies in the ratio 4:1. The ratio of their linear momentum is

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

6. A mass m slides from rest down the surface of a frictionless hemispherical bowl of radius r from the highest point A. The velocity of mass when it reaches the bottom is



(a) $\sqrt{2gr}$ (b) $\sqrt{mgr}$
(c) *2mgr* (d) gr

7. An engine develops 20 HP. When rotating at a speed of 1800 rev/min. The torque that it delivers is

(a) 400 N-m (b) 60N-m
(c) 40 N-m (d) 80 N-m

8. How much deep inside the earth (radius R) should a mango, so that his weight becomes one-fourth of that on earth's surface?

(a) $\frac{R}{4}$ (b) $\frac{R}{2}$
(c) $\frac{3R}{4}$ (d) None of these

9. If the speed of light were $\frac{2}{3}$ of its present value, the energy released in a given atomic explosion will be decreased by a fraction

(a) $\frac{2}{3}$ (b) $\frac{4}{9}$
(c) $\frac{5}{9}$ (d) $\frac{2}{9}$

10. The difference between a photon and neutrino is

(a)the spin of photon is 1 and that of neutrino is $\frac{1}{2}$ in units of $\frac{h}{2\pi}$

(b) the spin of photon is $\frac{1}{2}$ and that of neutrino is 1 in units of $\frac{h}{2\pi}$

(c) both have equal spin but neutrino is electromagnetic in nature

(d) both have unequal spin but neutrino is electromagnetic in nature

11. Alcohol is more volatile than water, because

(a) its boiling point is lower than water

(b) it is an organic liquid

(c) its freezing point is lower than water

(d) its vapour pressure is 2.5 times greater than water

12. Certain substance emits wavelengths $\lambda_1, \lambda_2, \lambda_3$ and λ_4, when it is at a high temperature. When the substance is at a colder temperature, it will absorb only the following wavelengths

(a) λ_1 (b) λ_2

(c) λ_1 and λ_2 (d) $\lambda_1, \lambda_2, \lambda_3$ and λ_4

13. The deflection in a moving coil galvanometer is reduced to half when it is shunted with a coil of resistance S. The resistance of the galvanometer $G = 40\ \Omega$. The value of Sis

(a) $80\,\Omega$. (b) $40\,\Omega$.

(c) $20\,\Omega$. (d) $15\,\Omega$.

14. In Ingen-Hausz experiment the wax melts up to 5 cm and 10 cm on bars *A* and *B* respectively. The ratio of the thermal conductivities of A and B is

(a) 1 : 2 (b) 1 : 4

(c) 1:8 (d) 1 : 16

15. A body executes SHM with an amplitude A. Its energy is half kinetic and half potential when the displacement is

(a) $\frac{A}{3}$ (b) $\frac{A}{2}$

(c) $\frac{A}{\sqrt{2}}$ (d) $\frac{A}{2\sqrt{2}}$

16. The period of the simple pendulum in a stationary lift is *T*. If the lift move upwards with an acceleration *g*, the period will be

(a) ∞ (b) $\sqrt{\frac{3}{5}}T$

(c) $\sqrt{\frac{5}{3}}T$ (d) $\frac{T}{\sqrt{2}}$

17. A wave travelling along positive y-axis is given by $y = A \sin(\omega - kx)$. If it is reflected from rigid boundary such that 80% amplitude is reflected, then equation of reflected wave is

(a) $y = A\sin(\omega t + kx)$

(b) $y = -0.8A\sin(\omega t + kx)$

(c) $y = 0.8A\sin(\omega t + kx)$

(d) $y = A\sin(\omega t + 0.8kx)$

18. The surface charge density of the earth is

(a) 10^{-9} cm^{-2} (b) 10^{-6} cm^{-2}

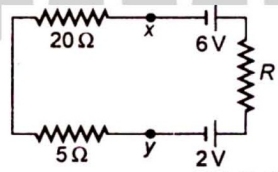
(c) -10^{-9} cm^{-2} (d) -100 cm^{-2}

19. The work done in increasing the voltage across the plates of a capacitor from 5V to 10 V is *W*. The work done in increasing the voltage from 10 V to 15V will be

(a) W (b) $\frac{4W}{3}$

(c) $\frac{5W}{3}$ (d) $2W$

20. The current flowing in the given circuit is 0.1 A. The potential difference between the points x and *y* is



(a) 4.0V (b) 3.0V

(c) 2.5V (d) 2.0V

21. The neutral temperature of a thermocouple is 300°C. What is the inversion temperature, if the temperature of cold junction is 10°C?

(a) 590°C (b) 610°C

(c) 310°C (d) 290°C

22. Two bulbs 100 W, 250 V and 200 W, 250 V are connected in parallel across a 500 V line. Then

(a) 100 W bulb will be fused

(b) 200 W bulb will be fused

(c) both bulbs will be fused
(d) no bulb will be fused

23. An electron is moving in a circle of radius r in a uniform magnetic field *B*. Suddenly the field is D reduced to $\frac{B}{2}$. The radius of the circle now becomes

(a) $\frac{r}{2}$ (b) $\frac{r}{4}$
(c) 2r (d) 4r

24. If the number of turns per unit length of a coil of solenoid is doubled, the self-inductance of solenoid will be
(a) remain unchanged
(b) be halved
(c) be doubled
(d) becomes four times

25. A copper ring is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet is
(a) equal to that due to gravity
(b) less than that due to gravity
(c) more than that due to gravity
(d) none of the above

26. An inductance, a capacitance and a resistance are connected in series across a source of alternating voltage. At resonance, the applied voltage and the current flowing through the circuit will have a phase difference

(a) $\frac{\pi}{4}$ (b) zero
(c) π (d) $\frac{\pi}{2}$

27. To which region of electromagnetic spectrum, the frequency 1 GHz corresponding?
(a) Ultraviolet rays (b) Radiowaves
(c) Visible radiation (d) X-rays

28. When an object is moved along the axis of a lens, images three times the size of the object are obtained when the object is at 16 cm and at 8 cm respectively from the lens. The focal length and nature of the lens are
(a) 12 cm, concave (b) 4 cm, concave
(c) 12 cm, convex (d) 4 cm, convex

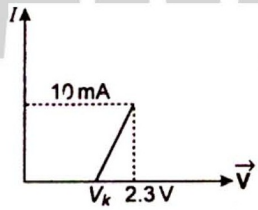
29. Which one of the following phenomena is used in optical fibres?
(a) Scattering
(b) Successive reflections
(c) Refraction
(d) Total internal reflection

30. The ratio of specific charge of a proton to that of an a-particle is
(a) 1 : 4 (b) 1: 2
(c) 4: 1 (d) 2 : 1

31. A metallic surface ejects electrons when exposed to green light of intensity I but no photoelectrons are emitted when exposed to yellow light of intensity I It is possible to eject electrons from the same surface by
(a)yellow light of same intensity which is more than I
(b) green light of any intensity
(c) red light of any intensity
(d) none of the above

32. In hydrogen spectrum the wavelength of H_α line is 656 nm, where as in the spectrum of a distant galaxy, H_α line wavelength is 706 nm. Estimated speed of galaxy with respect to earth is
(a) 2×10^8m/s (b) 2×10^7m/s
(c) 2×10^6m/s (d) 2×10^5m/s

33. The resistance of a germanium junction diode, whose *V-I* is shown in figure is $(V_k = 0.3V)$



(a) $5k\Omega$ (b) $0.2k\Omega$
(c) $2.3k\Omega$ (d) $\left(\frac{10}{2.3}\right)k\Omega$

34. A circular loop of radius *R* carrying current I lies in xy plane with its centre at origin. The total magnetic flux through $x-y$ plane is
(a) directly proportional to I
(b) directly proportional to *R*
(c) directly proportional to R^2
(d) zero

35. The essential distinction between X-rays and - y rays is that

(a) y -rays have smaller wavelength than -rays

(b) y -rays emanate from nucleus while X-rays emanate from outer part of the atom

(c) y -rays have greater ionizing power than X-rays

(d) y -rays are more penetrating than X-rays

36. A convex mirror is used to form an image of a real object. Then, the incorrect statement is

(a)The image lies between the pole and the focus

(b) The image is diminished in size

(c) The image is erect

(d) The image is real

37. A vessel is half-filled with a liquid of refractive index μ. The other half of the vessel is filled with an immiscible liquid of refractive index 1.5 μ. The apparent depth of the vessel is 50% of the actual depth. Then μ is

(a) 1.4 (b) 1.5

(c) 1.6 (d) 1.67

38. Which of the following is not a unit of charge?

(a) Faraday (b) Frankline

(c) Coulomb (d) Ampere/second

39. What is maximum height of a stone thrown vertically upward, if its velocity is halved in 1.5s?(g=10m/s^2)

(a) 20m (b) 25m

(c) 30m (d) 45m

40. In the Boolean algebra A B is same as

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

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

Answer – Key

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