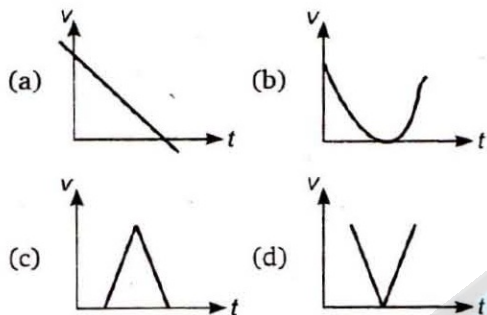


1. A man of mass 60 kg and a boy of mass 30 kg are standing together on frictionless ice surface. If they push each other apart, man moves away with a speed of 0.4 m/s relative to ice after 5 s. They will be away from each other at a distance of
- (a) 9.0 m (b) 3.0 m
(c) 6.0 m (d) 30 m
2. A ball is thrown vertically upwards. Which of the following graphs represents velocity-time graph of ball during its flight ignoring its resistance of air ?



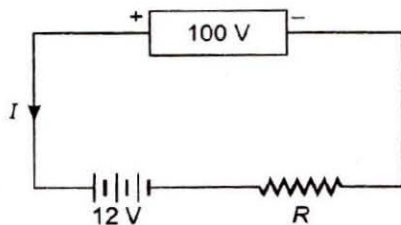
3. A particle moves along a straight line such that its displacement at any time t is given by

$$s = t^3 - 6t^2 + 3t + 4$$

The velocity when its acceleration is zero, is

- (a) 2 m/s (b) 12 m/s
(c) -9 m/s (d) 22 m/s
4. The refractive index of plastic is 1.25, the polarising angle and angle of refraction for light incident at the polarising angle will be respectively
- (a) 51.3° , 38.7° (b) 61.4° , 39.6°
(c) 71.4° , 49.6° (d) None of these
5. The critical angle of a medium with respect to air is 45° . The refractive index of that medium will be
- (a) 1.72 (b) 1.414
(c) 2.12 (d) 1.5

6. A man cannot see distinctly an object beyond 5 m. He wants to see the stars. The focal length of the lens which he must use, is
- (a) 5 m (b) 7 m
(c) 10 m (d) 2.5 m
7. The effective length of a magnet is 31.4 cm and its pole strength is 0.5 Am. Calculate its magnetic moment. If it is bent in form of semicircle, then magnetic moment will be
- (a) 0.157 Am^2 , 0.1 Am^2
(b) 0.357 Am^2 , 0.01 Am^2
(c) 1.157 Am^2 , 1.01 Am^2
(d) None of the above
8. The charge on two identical metallic balls are $+40 \mu\text{C}$ and $-10 \mu\text{C}$ respectively and they are separated at 2.0 m. How much and nature of force will act between them ?
- (a) 2.9 N, repulsive
(b) 1.9 N, attractive
(c) 1.2 N, repulsive
(d) 0.9 N, attractive
9. The radius of nucleus of silver (atomic number $Z = 47$) is 3.4×10^{-14} m. The electric potential on the surface of nucleus will be
- (a) 1.99×10^6 V (b) 2.99×10^6 V
(c) 3.99×10^6 V (d) None of these
10. The electrostatic and gravitational forces are in the ratio
- (a) $10^{-8} : 10^{-48}$ (b) $10^{-3} : 10^{-40}$
(c) $10^{-3} : 10^{-30}$ (d) $10^{-2} : 10^{-34}$
11. A battery is charged by a supply of 100 V as shown in figure. The charging current is 1.0 A. The value of R is



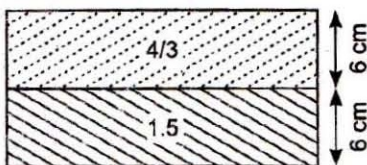
- (a) $88\ \Omega$ (b) $68\ \Omega$
(c) $44\ \Omega$ (d) None of these
12. A ball is thrown vertically upwards with an initial velocity $1.4\ \text{m/s}$ returns in $2\ \text{s}$. The total displacement of the ball will be
(a) $22.4\ \text{m}$ (b) zero
(c) $33.6\ \text{m}$ (d) $44.8\ \text{m}$
13. The capacitance of a metallic sphere is $1\ \mu\text{F}$, then its radius will be
(a) $10\ \text{m}$ (b) $1.11\ \text{km}$
(c) $9\ \text{km}$ (d) $1.11\ \text{m}$
14. The current gain α of a transistor in common base mode is 0.995 . Its gain β in the common emitter mode is
(a) 200 (b) 99
(c) 0.995 (d) None of these
15. If an electron is accelerated through a potential drop V of $100\ \text{V}$. It will have the wavelength equal to
(a) $1100\ \text{\AA}$ (b) $110\ \text{\AA}$
(c) $10\ \text{\AA}$ (d) $1\ \text{\AA}$
16. The ionisation potential of mercury is $10.39\ \text{V}$. How far an electron must travel in an electric field of $1.5 \times 10^6\ \text{V/m}$ to gain sufficient energy to ionize mercury ?
(a) $\frac{10.39}{1.5 \times 10^6} \times 1.0 \times 10^{-19}\ \text{m}$
(b) $\frac{10.39}{1.5 \times 10^6}\ \text{m}$
(c) $1.39 \times 1.6 \times 10^{-19}\ \text{m}$
(d) $\frac{10.39}{1.6 \times 10^{-19}}\ \text{m}$
17. A bucket full of water weighs $5\ \text{kg}$, it is pulled from a well $20\ \text{m}$ deep. There is a small hole in the bucket through which water leaks at a constant rate of $0.2\ \text{kg/m}$. The total work done in pulling the bucket up from the well is ($g = 100\ \text{m/s}^2$)
(a) $600\ \text{J}$ (b) $400\ \text{J}$
(c) $100\ \text{J}$ (d) $500\ \text{J}$
18. The magnetic induction at a distance r from the axis of an infinitely straight conductor which carries current I is
(a) $\frac{\mu_0 I}{2\pi r}$ (b) $\frac{\mu_0 I}{2r}$
(c) ∞ (d) zero
19. Two satellites A and B go round a planet in circular orbits having radii $4R$ and R respectively. If the speed of the satellite A is $3v$, the speed of satellite B will be
(a) $4v/3$ (b) $3v/2$
(c) $6v$ (d) $2v$
20. A proton and an α -particle are accelerated through same potential difference. The ratio of their de-Broglie wavelength λ_p/λ_α will be
(a) $\frac{1}{\sqrt{8}}$ (b) $\sqrt{8}$
(c) 2 (d) 1
21. Ultraviolet light wavelength $300\ \text{nm}$ and intensity $1.0\ \text{W/m}^2$ falls on the surface of photoelectric metal. If one percent of incident photons produced photoelectrons, then the number of photoelectrons emitted from an area of $1.0\ \text{cm}^2$ of the surface is nearly
(a) $2.13 \times 10^{11}/\text{s}$ (b) $1.5 \times 10^{12}/\text{s}$
(c) $3.02 \times 10^{12}/\text{s}$ (d) None of these
22. If the number of turns in a coil becomes doubled, then its self-inductance will be
(a) double (b) halved
(c) four times (d) unchanged
23. Two vessels of different materials are identical in size and wall thickness. They are filled with equal quantities of ice at 0°C . If the ice melts completely in $10\ \text{min}$ and $25\ \text{min}$ respectively, then the ratio of coefficients of thermal conductivities are
(a) $2 : 3$ (b) $5 : 3$
(c) $4 : 7$ (d) $5 : 2$
24. A particle undergoes a motion described by the equation

$$y(x, t) = 2(\sin \pi t + \cos \pi t)$$
The amplitude of the motion is
(a) $4\ \text{unit}$ (b) $2\sqrt{2}\ \text{unit}$
(c) $2\ \text{unit}$ (d) $\frac{1}{\sqrt{2}}\ \text{unit}$
25. Total energy emitted by a perfectly black body is directly proportional to T^n , where n is
(a) 1 (b) 2
(c) 3 (d) 4
26. The kinetic energy of electron moving with the velocity of $4 \times 10^6\ \text{m/s}$, will be
(a) $60\ \text{eV}$ (b) $50\ \text{eV}$
(c) $45\ \text{eV}$ (d) $30\ \text{eV}$

27. A tuning fork of frequency 340 Hz is vibrated just above the tube of 120 cm height. Water is poured slowly in the tube. What is the minimum height of water necessary for the resonance ?
(speed of sound in air = 340 m/s)
(a) 45 cm (b) 30 cm
(c) 35 cm (d) 25 cm
28. At which temperature, the speed of sound in air will be 1.6 times the speed of sound in air at 25°C ?
(a) 100 K (b) 116.4 K
(c) 30 K (d) 10 K
29. The speed of waves is 360 m/s and frequency is 50 Hz. Phase difference between two consecutive waves is 60°. Path difference between them will be
(a) 0.72 m (b) 120 m
(c) 0.73 m (d) 1.2 m
30. Magnifying power of objective of compound microscope is 8. If the magnifying power of microscope is 32. Then, magnifying power of eye piece will be
(a) 7 (b) 5
(c) 4 (d) 3
31. The current I passed in any instrument in an AC circuit is $I = 2 \sin \omega t$ A and potential difference applied is given by $V = 5 \cos \omega t$ volt. Power loss in the instrument is
(a) 10 W (b) 5 W
(c) zero (d) 20 W
32. In AC circuit in which inductance and capacitance are joined in series. Current is found to be maximum when the value of inductance is 0.5 H and the value of capacitance is 8 μF . The angular frequency of applied alternating voltage will be
(a) 4000 Hz (b) 5000 Hz
(c) 2×10^5 Hz (d) 500 Hz
33. A water film is formed between two parallel wires of 10 cm length. The distance of 0.5 cm between the wires is increased by 1 mm. What will be the work done ?
(surface tension of water = 72 N/m)
(a) 288 erg (b) 144 erg
(c) 72 erg (d) 36 erg
34. Adiabatic modulus of elasticity of a gas is $2.1 \times 10^5 \text{ N/m}^2$. What will be its isothermal modulus of elasticity ? $\left(\frac{C_p}{C_v} = 1.4\right)$
(a) $1.2 \times 10^5 \text{ N/m}^2$
(b) $4 \times 10^5 \text{ N/m}^2$
(c) $1.5 \times 10^5 \text{ N/m}^2$
(d) $1.8 \times 10^5 \text{ N/m}^2$
35. The energy of an electron in an excited hydrogen atom is -3.4 eV. Its angular momentum is
(a) $3.72 \times 10^{-34} \text{ J-s}$
(b) $2.11 \times 10^{-34} \text{ J-s}$
(c) $1.57 \times 10^{-34} \text{ J-s}$
(d) $1.11 \times 10^{-34} \text{ J-s}$
36. The bulk modulus of water is $2 \times 10^9 \text{ N/m}^2$. The change in pressure required to increase the density of water by 0.1% is
(a) $2 \times 10^4 \text{ N/m}^2$ (b) $2 \times 10^6 \text{ N/m}^2$
(c) $2 \times 10^8 \text{ N/m}^2$ (d) $2 \times 10^9 \text{ N/m}^2$
37. In a sinusoidal wave, the time required for a particular point to move from maximum displacement is 0.17 s. The frequency of wave is
(a) 2.94 Hz (b) 1.47 Hz
(c) 0.73 Hz (d) 0.36 Hz
38. When a slow neutron is captured by U^{235} nucleus. A fission results, which release 200 MeV energy. If the output of a nuclear reactor is 1.6 MW. The rate of nuclei undergoing fission is
(a) 4×10^{16} (b) 5×10^{16}
(c) 3×10^{16} (d) None of these
39. The range of particle when launched at an angle of 15° with the horizontal is 1.5 km. What is the range of the projectile when launched at an angle of 45° to the horizontal
(a) 3.0 km (b) 1.5 km
(c) 6.0 km (d) 0.75 km
40. In a magnetic field, with the value of induction is 0.9 Wb/m^2 , a simple line conductor 0.4 m long is moving with the velocity 7 m/s. The value of maximum induced motional emf will be
(a) 3 V (b) 2.52 V
(c) 2 V (d) 1 V
41. A stretched wire, 60 cm long is vibrating with its fundamental frequency 256 Hz. If the length of the wire is decreased to 15 cm and the tension remains the same, then the fundamental frequency of the vibration of the wire will be

- (a) 1024 Hz (b) 512 Hz
(c) 64 Hz (d) 256 Hz

42. Two immiscible liquids of refractive indices 1.5 and $\frac{4}{3}$ are filled in glass jar each of length 6 cm. A light of source S is at the bottom of the jar, the apparent depth of light source will be



- (a) 12.5 cm (b) 17 cm
(c) 12 cm (d) 8.5 cm
43. How many calories of heat will approximately be developed in a 210 W electric bulb in 5 min ?
(a) Zero (b) 63000
(c) 1050 (d) 15000
44. A torque of 10^{-5} N-m is required to hold a magnet at 90° with the horizontal component H of the earth's magnetic field. The torque required to hold it at 30° is
(a) $5\sqrt{3} \times 10^{-6}$ N-m
(b) $\frac{1}{3} \times 10^{-5}$ N-m
(c) 5×10^{-6} N-m
(d) undefined as H is not given

45. The unit of Planck's constant is
(a) $J \cdot s^{-1}$ (b) $J \cdot s$
(c) $J \cdot s^{-2}$ (d) $J^2 \cdot s$
46. Heat travels through vacuum by
(a) radiation (b) conduction
(c) convection (d) None of these
47. The velocity of electromagnetic wave in free space is 3×10^8 m/s. The frequency of radio waves of wavelength 150 m, is
(a) 2 MHz (b) 20 MHz
(c) 10 MHz (d) 2 kHz
48. If threshold wavelength for a certain metal is 2000 \AA , then the work function of metal is
(a) 6.2 MeV (b) 6.2 keV
(c) 6.2 J (d) 6.2 eV
49. The magnetic flux linked with the coil is given by the equation $\phi = 5t^2 + 3t + 16$. The induced emf in the coil in fourth second is
(a) 83 V (b) 43 V
(c) 23 V (d) 10 V
50. If at the same temperature and pressure, the densities for two diatomic gases are d_1 and d_2 respectively. Then, the ratio of velocities of sound in these gases will be
(a) $\sqrt{\frac{2d_1}{d_2}}$ (b) $\sqrt{\frac{d_2}{2d_1}}$
(c) $\sqrt{\frac{d_1}{d_2}}$ (d) $\sqrt{\frac{d_2}{d_1}}$

Answer – Key

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