

1. In which process the pV indicator diagram is a straight line parallel to volume axis
 (a) isothermal (b) isobaric
 (c) irreversible (d) adiabatic
2. A body executes simple harmonic motion under the action of force F_1 with a time period $\frac{3}{5}$ s. If the force is changed to F_2 it executes simple harmonic motion with time period $\frac{3}{4}$ s. If both forces F_1 and F_2 act simultaneously in the same direction on the body, its time period will
 (a) $\frac{12}{25}$ s. (b) $\frac{24}{25}$ s.
 (c) $\frac{24}{25}$ s. (d) $\frac{15}{12}$ s.
3. A diatomic gas is heated at constant pressure. What fraction of the heat energy is used to increase the internal energy?
 (a) $\frac{3}{5}$ (b) $\frac{3}{7}$
 (c) $\frac{5}{7}$ (d) $\frac{5}{9}$
4. In interference pattern, the energy is
 (a) created at the maximum
 (b) destroyed at the minimum
 (c) conserved but redistributed
 (d) All of the above
5. A red flower kept in green light will appear
 (a) red (b) yellow
 (c) black (d) white
6. band playing music at a frequency f is moving towards a wall at a speed v_b . A motorist is allowing the band with a speed v_m . If v be the R speed of the sound, the expression for beat frequency heard by motorist is
 (a) $\frac{v+v_m}{v+v_b} f$ (b) $\frac{v+v_m}{v-v_b} f$
 (c) $\frac{v+v_m(v+v_m)}{v^2-v_b} f$ (d) $\frac{2v_m(v+v_b)}{v^2-v_m} f$
7. An eye specialist prescribes spectacles having a combination of a convex lens of focal length 40 cm in contact with a concave lens of focal length 25 cm. The power of this lens combination will be
 (a) +1.5 D (b) -1.5 D
 (c) +6.67D (d) -6.67D
8. When light wave suffers reflection at the interface between air and glass, the change of phase of reflected wave is equal to
 (a) Zero (b) $\pi/2$
 (c) π (d) 2π
9. A lens behaves as a converging lens in air and diverging lens in water. The refractive index of the material of the lens is
 (a) equal to that of water
 (b) less than that of water
 (c) greater than that of water
 (d) Nothing can be predicted
10. The work function of a substance is 4.0 eV. The longest wavelength of light that can cause photoelectron emission from this substance is approximately
 (a) 540 nm (b) 400 nm

(c) 310 nm

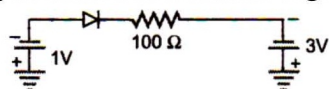
(d) 220 nm

11. The electron emitted in beta radiation originates from
- (a) inner orbits of atoms
 - (b) free electron existing in nuclei
 - (c) decay of neutron in the nucleus
 - (d) photon escaping from the nucleus

12. If elements with principal quantum number $n > 4$ were not allowed in nature, then the number of possible elements would be
- (a) 32
 - (b) 60
 - (c) 18
 - (d) 4

13. The magnifying power of telescope is high if
- (a) both objective and eye-piece have short focal length
 - (b) both objective and eye-piece have long focal length
 - (c) the objective has a long focal length and the eye-piece has a short focal length
 - (d) the objective has a short focal length and the eye piece has a long focal length

14. What is the current through an ideal pn -junction diode shown in figure below?



- (a) Zero
 - (b) 10mA
 - (c) 20mA
 - (d) 50mA
15. The output form of a full wave rectifier is
- (a) an AC voltage
 - (b) a DC voltage
 - (c) Zero
 - (d) a pulsating unidirectional voltage
16. Suitable impurities are added to a semiconductor depending on its use. This is done to
- (a) increase its life
 - (b) enable it to withstand high voltage
 - (c) increase its electrical conductivity
 - (d) increase its electrical resistivity
17. Absorption of X-rays is maximum in which of the following material sheets of same thickness
- (a) Cu
 - (b) Au
 - (c) Be
 - (d) Pb

18. Lenz's law is a consequence of the law of conservation of
- (a) charge
 - (b) mass
 - (c) momentum
 - (d) energy

19. A magnetic needle is kept in a non-uniform magnetic field. It experience
- (a) a force only but not a torque
 - (b) a force and torque both
 - (c) a torque only but not a force
 - (d) neither a torque nor a force

20. The magnitude of magnetic induction for a current carrying toroid of uniform cross-section is
- (a) uniform over the whole cross-section
 - (b) maximum on the outer edge
 - (c) maximum on the inner edge
 - (d) maximum at the centre of cross-section

21. Isogonic lines are those for which
- (a) declination is the same at all places on the line
 - (b) angle of dip is the same at the place on the line
 - (c) the value of horizontal component of earth's magnetic field is the same
 - (d) All of the above

22. An electric current passes through a long straight wire. At a distance 5 cm from the wire the magnetic field is B . The field at 20 cm from the wire would be
- (a) 25
 - (b) $B/4$
 - (c) $B/2$
 - (d) B

23. An ammeter and a voltmeter of resistance R are connected in series to an electric cell of negligible internal resistance. Their readings are A and V respectively. If another resistance P is connected in parallel with the voltmeter, then
- (a) both A and V will increase
 - (b) both A and V will decrease
 - (c) A will decrease and V will increase
 - (d) A will increase and V will decrease

24. The core of transformer is laminated to reduce the effect of
- (a) copper losses
 - (b) flux leakage
 - (c) hysteresis loss
 - (d) eddy current

25. The average power dissipation in pure inductance is
- (a) $\frac{1}{2}LI^2$ (b) $2LI^2$
(c) $\frac{1}{4}LI^2$ (d) Zero
26. The charge given to any conductor resides on its outer surface, because
- (a) the free charge tends to be in its minimum potential energy state
(b) the free charge tends to be in its minimum kinetic energy state
(c) the free charge tends to be in its maximum potential energy state
(d) the free charge tends to be in its maximum kinetic energy state
27. n identical mercury droplets charged to the same potential V coalesce to form a single bigger drop. The potential of new drop will be
- (a) $\frac{V}{n}$ (b) nV
(c) nV^2 (d) $n^{2/3}V$
28. For protecting sensitive equipment from external magnetic field, it should be
- (a) wrapped with insulation around it when passing current through it
(b) placed inside an iron can
(c) surrounded with Cu sheet
(d) placed inside aluminium can
29. The potential difference across the terminals of a battery is SO V when $11A$ current is drawn and 60 V when 1 A current is drawn. The emf and the internal resistance of the battery are
- (a) 62 V, 2Ω (b) $63V$, 1Ω .
(c) $61V$, 1Ω (d) $64V$, 2Ω
30. Four resistances 10Ω 5Ω 7Ω and 3Ω are connected so that they form the sides of a rectangle AB, BC, CD, and DA respectively. Another resistance of 10Ω is connected across the diagonal AC. The equivalent resistance between A and B is
- (a) 2Ω (b) 5Ω
(c) $7 a \Omega$ (d) 10Ω
31. The potential energy of a charged parallel plate capacitor is U_0 . If a slab of dielectric constant is inserted between the plates, then the new potential energy will be
- (a) $\frac{U_0}{K}$ (b) U_0K^2
(c) $\frac{U_0}{K^2}$ (c) U_0^2
32. Two similar heater coils separately take 10 min to boil a certain amount of water. If both coils are connected in series, time taken to boil the same amount of water will be
- (a) 15 min (b) 20 min
(c) 7-5 min (d) 25 min
33. Same current is being passed through a copper voltameter and a silver voltameter. The rate of increase in weights of the cathode of the two voltameters will be proportional to
- (a) atomic masses (b) atomic number
(c) relative densities (d) None of the above
34. Two equal and opposite charge ($+q$ and $-q$) are situated at x distance from each other, the value of potential at very far point will depend upon
- (a) only on q (b) only on x
(c) on qx (d) on $\frac{q}{x}$
35. In a potentiometer of one metre length, an unknown emf voltage source is balanced at 60 cm length of potentiometer wire, while a 3 V battery is balanced at 45 cm length. Then the emf of the unknown voltage source is
- (a) 3 V (b) 2.25 V
(c) 4 V (d) 4.5 V
36. A car travelling on a straight path moves with uniform velocity v_1 for some time and with velocity v_2 for next equal time, the average velocity is given by
- (a) $\sqrt{v_1v_2}$ (b) $\left(\frac{v_1+v_2}{2}\right)$
(c) $\left(\frac{1}{v_1} + \frac{1}{v_2}\right)$ (d) $2\left(\frac{1}{v_1} + \frac{1}{v_2}\right)$
37. A particle of mass m moves in a circular path radius r under the action of a force $\frac{mv_2}{r}$. The

work done during its motion over half of the circumference of the circular path will be

- (a) $\left(\frac{mv^2}{r}\right) \times 2\pi r$ (b) $\left(\frac{mv^2}{r}\right) \times \pi r$
 (c) $\frac{(2\pi r)}{\left(\frac{mv^2}{r}\right)}$ (d) zero

38. Dimensions of self-inductance are

- (a) $[MLT^{-2}A^{-3}]$ (b) $[ML^{-2}T^{-1}A^{-2}]$
 (c) $[ML^2T^{-2}A^{-2}]$ (d) $[ML^2A^{-1}]$

39. A car of mass m is moving with momentum p . If μ , be the coefficient of friction between the tyres and the road, what will be stopping distance due to friction alone ?

- (a) $\frac{p^2}{2\mu g}$ (b) $\frac{p^2}{2m\mu g}$
 (c) $\frac{p^2}{2m^2\mu g}$ (d) $\frac{p^2}{2mg}$

40. A neutron is moving with velocity u . It collides head on and elastically with an atom of mass number A . If the initial kinetic energy of the neutron be E , how much kinetic energy will be retained by the neutron after collision ?

- (a) $\left(\frac{A}{A+1}\right)^2 E$ (b) $\frac{A}{(A+1)^2} E$
 (c) $\left(\frac{A-1}{A+1}\right)^2 E$ (d) $\frac{A-1}{(A+1)^2} E$

Answer – Key

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