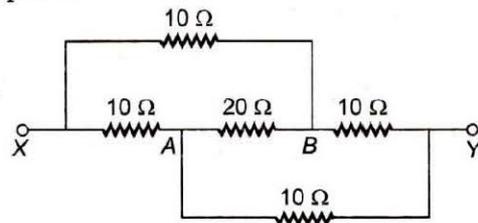


- Suitable impurities are added to a semiconductor depending on its use. This is done to
 - increase its electrical resistivity
 - increase its electrical conductivity
 - increase its life
 - enable it to tolerate higher voltage
- When an electron and a positron at rest are annihilated, then the number of photons produced is
 - 1
 - 2
 - 4
 - any arbitrary number
- A convex lens of focal length 20 cm produces a real image twice the size of the object. Then, the distance of the object from the lens is
 - 10 cm
 - 20 cm
 - 30 cm
 - 40 cm
- The separation between the plates of a parallel plate capacitor is d and area of each plate is A , when a slab of material of dielectric constant K and thickness t is introduced between the plates, the capacitance becomes
 - $\frac{\epsilon_0 A}{d+t\left(1-\frac{1}{K}\right)}$
 - $\frac{\epsilon_0 A}{d+t\left(1+\frac{1}{K}\right)}$
 - $\frac{\epsilon_0 A}{d-t\left(1-\frac{1}{K}\right)}$
 - $\frac{\epsilon_0 A}{d-t\left(1+\frac{1}{K}\right)}$
- When a potential difference V is applied across a conductor at temperature T , the thermal speed of electrons is proportional to
 - \sqrt{T}
 - T
 - V
 - zero
- If the electron in hydrogen atom jumps from third orbit to second orbit, the wavelength of the emitted radiation is given by

$$(a) \lambda = \frac{36}{5R} \quad (b) \lambda = \frac{5R}{36}$$

$$(c) \lambda = \frac{5}{R} \quad (d) \lambda = \frac{R}{6}$$

- In Young's double slit experiment, the fringe width is found to be 0.4 mm. If the whole apparatus is dipped in water of refractive index $4/3$, without disturbing the arrangement, the new fringe width will be
 - 0.30 mm
 - 0.40 mm
 - 0.53 mm
 - 0.2 m
- The final image formed by a microscope is
 - virtual and magnified
 - real and magnified
 - real and diminished
 - virtual and diminished
- A 10Ω thick wire is stretched so that its length becomes 3 times. Then the new resistance of the wire is
 - 10Ω
 - 30Ω
 - 90Ω
 - $\frac{10}{9} \Omega$
- Five resistances have been connected in the manner shown in figure. The equivalent resistance between points X and Y will be equal to



- 10Ω
 - 20Ω
 - 60Ω
 - $\frac{20}{3} \Omega$
- Eddy currents may be reduced by using
 - laminated core of steel
 - laminated core of soft iron
 - thick piece of cobalt
 - thick piece of nickel

12. The magnetic energy stored in an inductor coil varies with magnetic field induction B as
 (a) B (b) B^2
 (c) $\frac{1}{B}$ (d) B^0
13. The specific resistance of wire
 (a) varies with its length
 (b) varies with its cross-section
 (c) varies with its mass
 (d) is independent of length, cross-section and mass of the wire
14. Retentivity is maximum for
 (a) steel (b) soft iron
 (c) copper (d) silver
15. The characteristic property of light waves which does not vary with the medium is
 (a) amplitude (b) velocity
 (c) frequency (d) wavelength
16. The focal length of a concave mirror is
 (a) maximum for red colour
 (b) maximum for violet colour
 (c) maximum for yellow colour
 (d) same for all colours
17. A force F is applied on a body and it moves with a velocity v , the power will be
 (a) $F \cdot v$ (b) $\frac{F}{v}$
 (c) Fv^2 (d) $\frac{F}{v^2}$
18. For the same kinetic energy, the momentum is maximum for
 (a) an electron (b) a proton
 (c) a deuteron (d) an α -particle
19. Four spheres each of diameter $2a$ and mass M are placed with their centres on the four corners of a square of side b . The moment of inertia of the system about any side of the square will be
 (a) $\frac{8}{5}Ma^2 + 2Mb^2$
 (b) $\frac{8}{5}Ma^2 + Mb^2$
 (c) $\frac{8}{5}Ma^2 + 4Mb^2$
 (d) $\frac{8}{5}Ma^2 + 16Mb^2$
20. A ring of radius r and mass m rotates about an axis passing through its centre and perpendicular to its plane, its kinetic energy is
 (a) $mr\omega$ (b) $\frac{1}{2}mr\omega^2$
 (c) $mr^2\omega^2$ (d) $\frac{1}{2}mr^2\omega^2$
21. If the speed of the rotation of earth increases, then the weight of the body on the equator
 (a) increases
 (b) decreases
 (c) remains unchanged
 (d) may increase or decrease
22. An organ pipe P_1 closed at one end and vibrating in its first overtone and another pipe P_2 open at both ends vibrating in its second overtone are in resonances. The ratio of length of pipes P_1 and P_2 is
 (a) 1 (b) $\frac{1}{2}$
 (c) $\frac{1}{3}$ (d) $\frac{3}{4}$
23. The equation of a wave travelling in a string is given as $y = 3 \cos \pi (100t - x)$. Its wavelength is
 (a) 3 cm (b) 100 cm
 (c) 2 cm (d) 5 cm
24. A star is moving away from the earth with a velocity of 10^5 m/s. The shift in the spectral line of wavelength 5700 \AA as observed on the earth is
 (a) 0.75 \AA (b) 1.75 \AA
 (c) 1.9 \AA (d) 2.01 \AA
25. Two sound waves are $y_1 = a \sin (\omega t - kx)$
 $y_2 = a \cos (\omega t - kx)$, the phase difference between the two waves is
 (a) $\pi/2$ (b) $\pi/4$
 (c) π (d) zero
26. The velocity of sound in air is not affected by changes in
 (a) moisture contents in air
 (b) temperature of air
 (c) the atmospheric pressure
 (d) the composition of air
27. The velocity of light in a medium of refractive index $3/2$ is
 (a) 2×10^8 m/s (b) 4×10^8 m/s
 (c) 5×10^5 m/s (d) 9×10^5 m/s

28. The image formed by a convex mirror is
 (a) virtual, erect and diminished
 (b) virtual, erect and enlarged
 (c) real, inverted and diminished
 (d) real, inverted and enlarged
29. In a reflecting astronomical telescope, parabolic mirrors are used because they are free from
 (a) spherical aberration
 (b) chromatic aberration
 (c) spherical and chromatic aberration both
 (d) no aberration
30. To remove the chromatic aberration, combination of lens should be such that
 (a) $F_R + F_V = 0$ (b) $F_R > F_V$
 (c) $F_R < F_V$ (d) $F_R - F_V = 0$
31. For a long cylindrical source of light, the illuminance I on a screen varies with distance r as
 (a) $I \propto r^{-2}$ (b) $I \propto r^{-1}$
 (c) $I \propto r^0$ (d) $I \propto r^2$
32. The radius of curvature of curved surface of a plano-convex lens is 15 cm and refractive index of lens material is 1.6. The power of the lens will be
 (a) 1.66 D (b) 4 D
 (c) -1.0 D (d) -3.75 D
33. A beam of monochromatic blue light of wavelength 4200 Å in air travels in water (refractive index 4/3), its wavelength in water will be
 (a) 2800 Å (b) 3150 Å
 (c) 4000 Å (d) 5600 Å
34. Rays of light fall on a glass plate of refractive index μ . If the angle between reflected and refracted rays is 90° , then the angle of incidence is
 (a) $\sin^{-1}(\mu)$ (b) $\cos^{-1}(\mu)$
 (c) $\tan^{-1}(\mu)$ (d) $\tan^{-1}\left(\frac{1}{\mu}\right)$
35. A plane glass slab is placed over letters of different colours which letters appears to be raised most
 (a) red
 (b) violet
 (c) yellow
 (d) all coloured letters appear equally raised
36. When an ideal diatomic gas is heated at constant pressure, the fraction of the heat energy supplied, which increases the internal energy of the gas, is
 (a) $\frac{2}{5}$ (b) $\frac{3}{5}$
 (c) $\frac{3}{7}$ (d) $\frac{5}{7}$
37. The second law of thermodynamics is concerned with the
 (a) conservation of energy
 (b) conservation of number of moles
 (c) transformation of heat energy into work
 (d) conservation of temperature
38. At which of the following temperature would the molecules of a gas have twice, the average kinetic energy they have at 20°C ?
 (a) 313°C (b) 373°C
 (c) 393°C (d) 586°C
39. An iron piece falls from a height of 1 km on the ground. If all the energy is converted into heat, the temperature of the iron piece will be (specific heat of iron = $0.1 \text{ kcal/kg } ^\circ\text{C}$)
 (a) 0.233°C (b) 2.33°C
 (c) 23.8°C (d) 233°C
40. If a given mass of a gas occupies a volume 100 m^3 at 1 atmospheric pressure and temperature of 100°C , what will be its volume at 4 atmospheric pressure the temperature being the same?
 (a) 25 m^3 (b) Zero
 (c) 50 m^3 (d) 5 m^3
41. Work done by a system is zero in
 (a) isothermal process
 (b) adiabatic process
 (c) isochoric process
 (d) isobaric process
42. 1 mole of a monoatomic gas is first heated at constant volume by 100°C . The change in internal energy of the gas is ΔU_1 . Next it is heated at constant pressure at 100°C , the change in internal energy of the gas is ΔU_2 . Then, the ratio $\frac{\Delta U_1}{\Delta U_2}$
 (a) 1 (b) $\frac{3}{5}$
 (c) $\frac{5}{3}$ (d) uncertain

43. If the degrees of freedom of a gas is f , then the ratio of its specific heats $\frac{C_p}{C_v}$ is given by
- (a) $1 + \frac{2}{f}$ (b) $1 - \frac{2}{f}$
 (c) $1 + \frac{1}{f}$ (d) $1 - \frac{1}{f}$
44. In bringing an electron towards another electron, electrostatic potential energy of system
- (a) decreases
 (b) increases
 (c) remains unchanged
 (d) becomes zero
45. Viscosity is most closely related to
- (a) friction
 (b) adhesive molecular force
 (c) cohesive molecular force
 (d) Bernoulli's theorem
46. The substances which are repelled by a magnet are called
- (a) diamagnetic substances
 (b) paramagnetic substances
 (c) ferromagnetic substances
 (d) supermagnetic substances
47. The time constant of L - R circuit is
- (a) L - R (b) $\frac{L}{R}$
 (c) $\frac{R}{L}$ (d) $\frac{1}{L-R}$
48. In a common emitter amplifier the load resistance of the output circuit is 1000 times the load resistance of the input circuit. If $\alpha = 0.98$, then voltage gain is given by
- (a) 29 (b) 29×10^3
 (c) 49×10^3 (d) 49
49. The minimum wavelength of X-rays produced by electrons accelerated by a potential difference of V volts is
- (a) $\frac{eV}{vc}$ (b) $\frac{eV}{hc}$
 (c) $\frac{hc}{eV}$ (d) $\frac{h}{v}$
50. According to Bohr's theory the relation between principal quantum number n and radius (r) of orbit
- (a) $r \propto \frac{1}{n}$ (b) $r \propto n$
 (c) $r \propto n^2$ (d) $r \propto \frac{1}{n^2}$

Answer – Key

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