

11. An unpolarised beam of intensity I_0 falls on a polaroid. The intensity of the emergent light is

- 1) $I_0/2$
- 2) I_0
- 3) $I_0/4$
- 4) Zero

12. Which of the following is a dichroic crystal ?

- 1) Quartz
- 2) Tourmaline
- 3) Mica
- 4) Selenite

13. Two identical metal spheres charged with $+12\mu F$ and $-8\mu F$ are kept at certain distance in air. They are brought into contact and then kept at the same distance. The ratio of the magnitudes of electrostatic forces between them before and after contact is

- 1) 12 : 1
- 2) 8 : 1
- 3) 24 : 1
- 4) 4 : 1

14. A small conducting sphere of radius r is lying concentrically inside a bigger hollow conducting sphere of radius R . The bigger and smaller spheres are charged with Q and q ($Q > q$) and are insulated from each other. The potential difference between the spheres will be

- 1) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{q}{R} \right)$
- 2) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{R} - \frac{Q}{r} \right)$
- 3) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{Q}{R} \right)$
- 4) $\frac{1}{4\pi\epsilon_0} \left(\frac{Q}{R} + \frac{q}{r} \right)$

15. The charges Q , $+q$ and $+q$ are placed at the vertices of an equilateral triangle of side l . If the net electrostatic potential energy of the system is zero, then Q is equal to

- 1) $-q/2$
- 2) $-q$
- 3) $+q/2$
- 4) zero

(Space for Rough Work)

31. Solar spectrum is an example for
- 1) line emission spectrum
 - 2) continuous emission spectrum
 - 3) band absorption spectrum
 - 4) line absorption spectrum
32. When a piece of metal is illuminated by a monochromatic light of wavelength λ , then stopping potential is $3Vs$. When same surface is illuminated by light of wavelength 2λ , then stopping potential becomes Vs . The value of threshold wavelength for photoelectric emission will be
- 1) 4λ
 - 2) 8λ
 - 3) $\frac{4}{3}\lambda$
 - 4) 6λ
33. The maximum kinetic energy of emitted electrons in a photoelectric effect does not depend upon
- 1) wavelength
 - 2) frequency
 - 3) intensity
 - 4) work function
34. The ratio of minimum wavelengths of Lyman and Balmer series will be
- 1) 1.25
 - 2) 0.25
 - 3) 5
 - 4) 10
35. Hydrogen atom does not emit X-rays because
- 1) it contains only a single electron
 - 2) energy levels in it are far apart
 - 3) its size is very small
 - 4) energy levels in it are very close to each other

(Space for Rough Work)

36. If an electron and a proton have the same de-Broglie wavelength, then the kinetic energy of the electron is
- 1) zero
 - 2) less than that of a proton
 - 3) more than that of a proton
 - 4) equal to that of a proton
37. Two protons are kept at a separation of 40 \AA . F_n is the nuclear force and F_e is the electrostatic force between them. Then
- 1) $F_n \gg F_e$
 - 2) $F_n = F_e$
 - 3) $F_n \ll F_e$
 - 4) $F_n \approx F_e$
38. Blue colour of sea water is due to
- 1) interference of sunlight reflected from the water surface
 - 2) scattering of sunlight by the water molecules
 - 3) image of sky in water
 - 4) refraction of sunlight
39. The ratio of the nuclear radii of elements with mass numbers 216 and 125 is
- 1) 216 : 125
 - 2) $\sqrt{216} : \sqrt{125}$
 - 3) 6 : 5
 - 4) none of these
40. On bombarding U^{235} by slow neutron, 200 MeV energy is released. If the power output of atomic reactor is 1.6 MW, then the rate of fission will be
- 1) $5 \times 10^{22} / s$
 - 2) $5 \times 10^{16} / s$
 - 3) $8 \times 10^{16} / s$
 - 4) $20 \times 10^{16} / s$

(Space for Rough Work)

46. Dimensional formula for the universal gravitational constant G is

1) $M^{-1}L^2T^{-2}$

2) $M^0L^0T^0$

3) $M^{-1}L^3T^{-2}$

4) $M^{-1}L^3T^{-1}$

47. A body is projected vertically upwards. The times corresponding to height h while ascending and while descending are t_1 and t_2 respectively. Then the velocity of projection is (g is acceleration due to gravity)

1) $g\sqrt{t_1t_2}$

2) $\frac{gt_1t_2}{t_1+t_2}$

3) $\frac{g\sqrt{t_1t_2}}{2}$

4) $\frac{g(t_1+t_2)}{2}$

48. A mass of 10 kg is suspended from a spring balance. It is pulled aside by a horizontal string so that it makes an angle of 60° with the vertical. The new reading of the balance is

1) 20 kg.wt

2) 10 kg.wt

3) $10\sqrt{3}$ kg.wt

4) $20\sqrt{3}$ kg.wt

49. A body weighs 50 grams in air and 40 grams in water. How much would it weigh in a liquid of specific gravity 1.5?

1) 30 grams

2) 35 grams

3) 65 grams

4) 45 grams

50. A body of mass 4 kg is accelerated upon by a constant force, travels a distance of 5 m in the first second and a distance of 2 m in the third second. The force acting on the body is

1) 2 N

2) 4 N

3) 6 N

4) 8 N

(Space for Rough Work)

51. A simple pendulum is suspended from the ceiling of a lift. When the lift is at rest its time period is T . With what acceleration should the lift be accelerated upwards in order to reduce its period to $T/2$? (g is acceleration due to gravity).

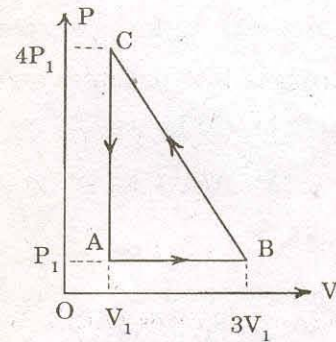
- 1) $2g$
- 2) $3g$
- 3) $4g$
- 4) g

52. If γ is the ratio of specific heats and R is the universal gas constant, then the molar specific heat at constant volume C_v is given by

- 1) γR
- 2) $\frac{(\gamma-1)R}{\gamma}$
- 3) $\frac{R}{\gamma-1}$
- 4) $\frac{\gamma R}{\gamma-1}$

53. An ideal gas is taken via path ABCA as shown in figure. The network done in the whole cycle is

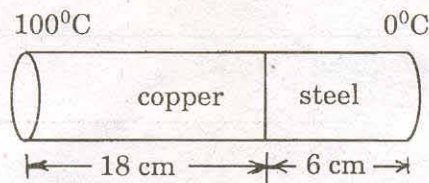
- 1) $3P_1V_1$
- 2) $-3P_1V_1$
- 3) $6P_1V_1$
- 4) zero



54. In which of the processes, does the internal energy of the system remain constant ?

- 1) Adiabatic
- 2) Isochoric
- 3) Isobaric
- 4) Isothermal

55. The coefficient of thermal conductivity of copper is 9 times that of steel. In the composite cylindrical bar shown in the figure, what will be the temperature at the junction of copper and steel ?



- 1) $75^{\circ}C$
- 2) $67^{\circ}C$
- 3) $25^{\circ}C$
- 4) $33^{\circ}C$

(Space for Rough Work)

56. The equation of a simple harmonic wave is given by $y = 6\sin 2\pi(2t - 0.1x)$, where x and y are in mm and t is in seconds. The phase difference between two particles 2 mm apart at any instant is

- 1) 18°
- 2) 36°
- 3) 54°
- 4) 72°

57. With what velocity should an observer approach a stationary sound source so that the apparent frequency of sound should appear double the actual frequency? (v is velocity of sound).

- 1) $v/2$
- 2) $3v$
- 3) $2v$
- 4) v

58. If a black body emits 0.5 joules of energy per second when it is at 27°C , then the amount of energy emitted by it when it is at 627°C will be

- 1) 40.5 J
- 2) 162 J
- 3) 13.5 J
- 4) 135 J

59. A string vibrates with a frequency of 200 Hz. When its length is doubled and tension is altered, it begins to vibrate with a frequency of 300 Hz. The ratio of the new tension to the original tension is

- 1) 9 : 1
- 2) 1 : 9
- 3) 3 : 1
- 4) 1 : 3

60. How many times more intense is a 60 dB sound than a 30 dB sound ?

- 1) 1000
- 2) 2
- 3) 100
- 4) 4

(Space for Rough Work)