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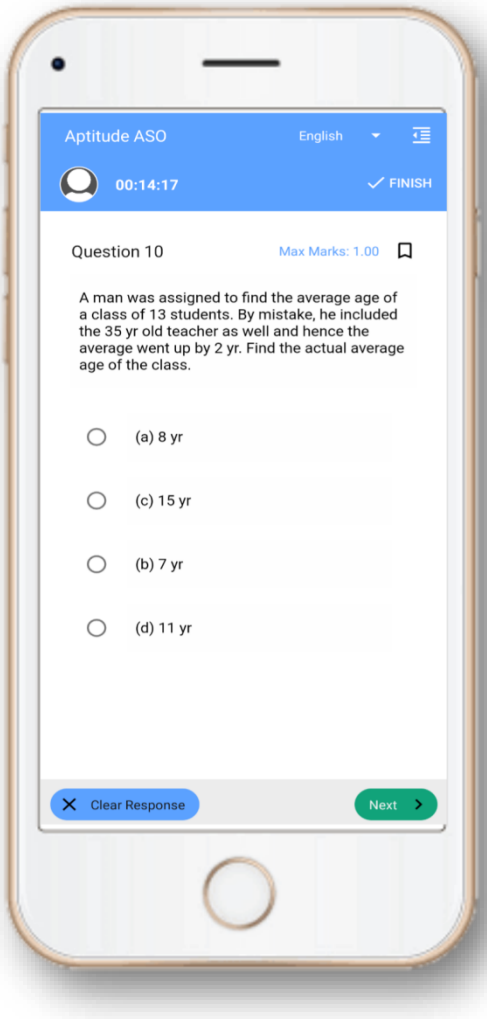

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Electricity Magnetism 6

B-SECTION – III

SCIENCE (PCM)

PHYSICS

41. An electric bulb rated 200V and 100W is connected to a 160V power supply. What power will be consumed by the bulb ?

(A) 64 W (B) 80 W

(C) 100 W (D) 160 W

42. The radius R of a soap bubble is increased to 2R. What is the percentage change in the excess pressure inside the soap bubble ?

(A) 100 (B) 75

(C) 50 (D) – 50

43. A copper wire is of the same length but double the diameter of a steel wire. Both the wires hung from the same roof are stretched by the same stretching force. $\Delta\ell_c$ and Y_c are the elongation and Young's modulus of copper respectively whereas $\Delta\ell_s$ and Y_s are the same for steel. If $Y_c = 5Y_s$, then what is $\Delta\ell_c / \Delta\ell_s$?

(A) 0.125 (B) 0.50

(C) 1.00 (D) 2.00

44. A steel ball of radius 4 cm has a mass of 1.25 kg in air. When weighed inside a liquid its weight becomes 8N. What is the force of buoyancy on the ball if g = 10 m/s^2 ?

(A) 1.56 N (B) 3.6 N

(C) 4 N (D) 4.5 N

45. What is the name of the process involved in the sound wave propagation in air ?

(A) Isothermal (B) Isochoric

(C) Adiabatic (D) Isobaric

46. The relative velocity of B with respect to (w. r. t) A is 30 cm/s due north and that of C w. r. t. B is 30 cm/s due west. Then what is the relative velocity of C w. r. t. A in cm/s ?

(A) $30\sqrt{2}$ in north-west direction

(B) $30\sqrt{2}$ in east-north direction

(C) $15\sqrt{2}$ in north-west direction

(D) $15\sqrt{2}$ in north-east direction

47. A sleeping dog starts running with a uniform acceleration of $2m/s^2$ when a rabbit crosses it in a straight, narrow passage. It catches the rabbit after covering 36 m. What is the distance covered by the dog in the last second ?

(A) 25 m (B) 13 m

(C) 11 m (D) 06 m

48. What is the minimum distance between an object and its real image formed by a convex lens of focal length f ?

(A) Zero

(B) 2f

(C) 3f

(D) 4f

49. In a Young's double slit experiment $I_{maxi} : I_{min} = 49 : 9 \left(I_{max}/I_{min} = 49/9 \right)$, where I stands for the intensity of the interference pattern. What is the ratio of $I_a : I_b$ where I_a and I_b stand for the intensities of the coherent sources a and b. Assume that $I_a > I_b$:

(A) 2 : 5 (B) 5 : 2

(C) 4 : 25 (D) 25 : 4

50. The –ve and +ve charges of a dipole of moment $\vec{p}$ are placed at points $-\hat{i}a$ and $+\hat{i}a$. The electric field intensity due to the dipole at the point located at $\hat{j}y$ in air where y >> a is :

(A) $\vec{p}/4\pi\epsilon_o y^3$

(B) $-\vec{p}/4\pi\epsilon_o y^3$

(C) $\vec{p}/2\pi\epsilon_o y^3$

(D) $-\vec{p}/2\pi\epsilon_o y^3$

51. An object is placed perpendicularly to the axis of a concave mirror so that the image formed is erect and magnified. What is the position of the object in front of the mirror ?

(A) Between its pole and focus

(B) At its focus

(C) Between its focus and centre of curvature

(D) Beyond its centre of curvature

52. A 2μF capacitor only is connected to the terminals of 220V a. c. soruce of frequency 50 Hz. What is the reactance of the circuit ?

(A) $\frac{5 \times 10^{-3}}{\pi}$ Ohm

(B) $\frac{5 \times 10^{3}}{\pi}$ Ohm

(C) $5\pi \times 10^3$ Ohm

(D) $5\pi \times 10^{-3}$ Ohm

53. A charge of 0.2C moves with a velocity $\vec{v} = (3\hat{i} + 4\hat{j})$m/s in a uniform magnetic field of $B = 5\hat{k}$T. What is the magnetic force experienced by the charge ?

(A) $(4\hat{i} + 3\hat{j})$ N

(B) $(4\hat{i} - 3\hat{j})$ N

(C) $(3\hat{j} - 4\hat{i})$ N

(D) $(-4\hat{i} - 3\hat{j})$ N

54. Assume that the semi major axis of Jupiter is half of that of Saturn. If the time period of revolution of Jupiter is taken to be x years, what will be the time period of revolution of Saturn in years ?

(A) 2x

(B) $2\sqrt{2}\,x$

(C) 3x

(D) $3\sqrt{2}\,x$

(Continued)

55. A projectile is projected with a speed of 10 m/s in a direction which makes 30° with the horizontal. Another projectile projected with the same initial speed from the same point but in a different direction, covers the same horizontal range as the first one. Then what is $H_1 : H_2$, where H_1 and H_2 are the maximum heights to which the first and the second projectiles rise ?

(A) 1 : 1

(B) 1 : 2

(C) 1 : 3

(D) 1 : 4

56. A hollow spherical shell of radius 40 cm contains two point charges 3q and – 3q placed at points separated by 30 cm inside the shell. What is the flux of the electric field due to the charges through the surface of the shell ?

(A) Zero

(B) $3q/\epsilon_o$

(C) $6q/\epsilon_o$

(D) qq^2/ϵ_o

(Where ϵ_o is the permittivity of air)

57. Which physical property of the geostationary satellite is common with that of earth ?

(A) Linear velocity

(B) Linear acceleration

(C) Angular velocity

(D) Angular momentum

58. A coil of area $06m^2$ is placed in a magnetic field of 1T such that maximum flux is linked with it. When the coil is rotated for 0.15s the flux is reduced by 25%. What is the instantaneous induced emf in the coil ?

(A) 0.15 V (B) 0.60 V

(C) 1V (D) 1.5 V

59. In the given wave equation $y = 60 \sin \frac{\pi}{3} (6t - x)$, what are the values of wavelength and frequency respectively if all the quantities are expressed in S. I. system ?

(A) 3, 2 (B) 2, 3

(C) 6, 1 (D) 1, 6

60. A straight wire of length ℓ carries current I. When it is bent into a circular loop of radius r, the magnetic field at its centre is B. If it is bent into a loop of two turns the magnetic field at its centre is B_1. Then which of the following relations is correct ?

(A) $B_1 = B/4$ (B) $B_1 = B/2$

(C) $B_1 = B$ (D) $B_1 = 4B$