PHYSICS - CET 2019 - VERSION – A2
KEYS

1. In a cyclotron a charged particle
   (A) speeds up in dee
   (B) undergoes acceleration all the time
   (C) slows down within a dee and speeds up between dees
   (D) speeds up between the dees because of the magnetic field.
   Ans (B)

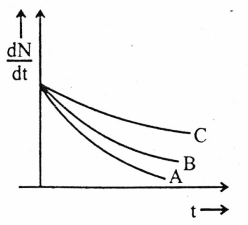
2. The number of turns in a coil of Galvanometer is tripled, then
   (A) Both voltage and current sensitivity remains constant
   (B) Voltage sensitivity increases 3 times and current sensitivity remains constant
   (C) Both voltage and current sensitivity decreases by 33%
   (D) Voltage sensitivity remains constant and current sensitivity increases 3 times
   Ans (D)

3. A circular current loop of magnetic moment M is in an arbitrary orientation in an external uniform magnetic field $\vec{B}$. The work done to rotate the loop by 30° about an axis perpendicular to its plane is
   (A) $\frac{MB}{2}$ (B) MB (C) Zero (D) $\sqrt{3}\frac{MB}{2}$
   Ans (C)

4. In a permanent magnet at room temperature
   (A) domains are partially aligned.
   (B) magnetic moment of each molecule is zero.
   (C) domains are all perfectly aligned.
   (D) the individual molecules have non-zero magnetic moment which are all perfectly aligned.
   Ans (A)

5. Coersivity of a magnet where the ferromagnet gets completely demagnetized is 3×10^3 Am^{-1}. The minimum current required to be passed in a solenoid having 1000 turns per metre, so that the magnet gets completely demagnetized when placed inside the solenoid is
   (A) 3 A (B) 30 mA (C) 6 A (C) 60 mA
   Ans (A)

6. Which one of the following nuclei has shorter mean life?
   (A) C
   (B) A
   (C) Same for all
   (D) B



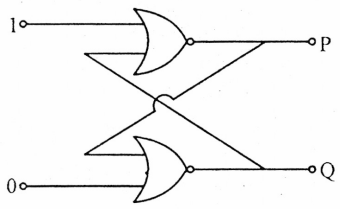
   Ans (B)

7. The conductivity of semiconductor increases with increase in temperature because
   (A) both number density of charge carriers and relaxation time increase
   (B) number density of charge carriers increases
   (C) number density of current carriers increases, relaxation time decreases but effect of decrease in relaxation time is much less than increase in number density
   (D) relaxation time increases
   Ans (B)

8. For a transistor amplifier, the voltage gain
   (A) is low at high and low frequencies and constant at mid frequencies
   (B) remains constant for all frequencies
   (C) constant at high frequencies and low at low frequencies
   (D) is high at high and low frequencies and constant in the middle frequency range
   Ans (A)

9. In the following circuit, what are P and Q?

   (A) P = 0, Q = 1
   (B) P = 0, Q = 0
   (C) P = 1, Q = 1
   (D) P = 1, Q = 0

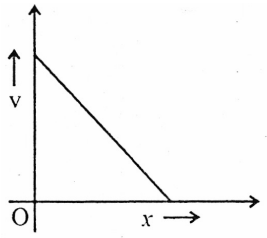


   Ans (A)

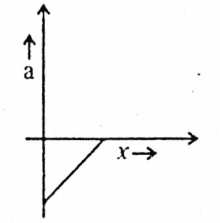
10. An antenna uses electromagnetic waves of frequency 5 MHz. For proper working, the size of the antenna should be
    (A) 15 km (B) 15 m (C) 3 km (D) 300 m
    Ans (B)

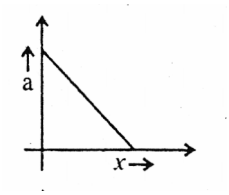
11. If P, Q and R are physical quantities having different dimensions, which of the following combinations can never be a meaningful quantity?
    (A) $\frac{PQ}{R}$ (B) $\frac{P-Q}{R}$ (C) $\frac{PR-Q^2}{R}$ (D) PQ – R
    Ans (B)

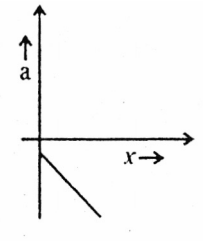
12. The given graph shows the variation of velocity (v) with position (x) for a particle moving along a straight line

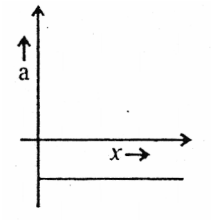


Which of the following graph shows the variation of acceleration (a) with position (x)?

(A) 

(B) 

(C) 

(D) 

Ans (D)

13. The trajectory of a projectile projected from origin is given by the equation $y = x - \frac{2x^2}{5}$. The initial velocity of the projectile is

(A) 25 ms^{-1} (B) $\frac{2}{5} ms^{-1}$ (C) $\frac{5}{2} ms^{-1}$ (D) 5 ms^{-1}

Ans (D)

14. An object with mass 5 kg is acted upon by a force, $\vec{F} = \left(-3\hat{i} + 4\hat{j}\right) N$. If its initial velocity at t = 0 is $\vec{v} = \left(6\hat{i} - 12\hat{j}\right)$ m s^{-1}, the time at which it will just have a velocity along y-axis is

(A) 2 s (B) 5 s (C) 15 s (D) 10 s

Ans (D)

15. During inelastic collision between two objects, which of the following quantity always remains conserved?

(A) Total linear momentum (B) Total kinetic energy
(C) Speed of each body (D) Total mechanical energy

Ans (A)

16. In Rutherford experiment, for head-on collision of α-particles with a gold nucleus, the impact parameter is

(A) of the order of 10^{-10} m (B) zero
(C) of the order of 10^{-6} m (D) of the order of 10^{-14} m

Ans (D)

17. Frequency of revolution of an electron revolving in n^{th} orbit of H-atom is proportional to

(A) n independent of n (B) $\frac{1}{n^2}$ (C) $\frac{1}{n^3}$ (D) n

Ans (C)

18. A hydrogen atom in ground state absorbs 10.2 eV of energy. The orbital angular momentum of the electron is increased by

(A) 3.16×10^{-34} Js (B) 1.05×10^{-34} Js (C) 4.22×10^{-34} Js (D) 2.11×10^{-34} Js

Ans (B)

19. The end product of decay of $_{90}Th^{232}$ is $_{82}Pb^{208}$. The number of α and β particles emitted are respectively

(A) 6, 0 (B) 3, 3 (C) 4, 6 (D) 6, 4

Ans (D)

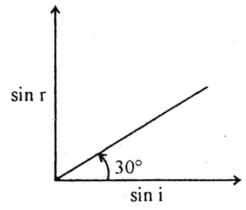
20. Two protons are kept at a separation of 10 nm. Let F_n and F_e be the nuclear force and the electromagnetic force between them

(A) $F_e << F_n$ (B) $F_e = F_n$

(C) F_e and F_n differ only slightly (D) $F_e >> F_n$

Ans (D)

21. A transparent medium shows relation between i and r as shown. If the speed of light in vacuum is c the Brewster angle for the medium is



(A) 60°
(B) 30°
(C) 90°
(D) 45°

Ans (A)

22. In Young's double slit experiment using monochromatic light of wavelength λ, the intensity of light at a point on the screen where path different is λ is K units. The intensity of light at a point where path difference is $\frac{\lambda}{3}$ is

(A) 4 K (B) K (C) 2 K (D) $\frac{K}{4}$

Ans (D)

23. Due to Doppler's effect the shift in wavelength observed is 0.1 Å for a star producing wavelength 6000 Å. Velocity of recession of the star will be

(A) 5 km/s (B) 25 km/s (C) 20 km/s (D) 10 km/s

Ans (A)

24. An electron is moving with an initial velocity $\vec{V} = V_0\hat{i}$ and is in a uniform magnetic field $\vec{B} = B_0\hat{j}$. Then its de Broglie wavelength

(A) decreases with time (B) remains constant

(C) increase and decreases periodically (D) increases with time

Ans (B)

25. Light of certain frequency and intensity incident on a photosensitive material causes photoelectric effect. If both the frequency and intensity are doubled, the photoelectric saturation current becomes

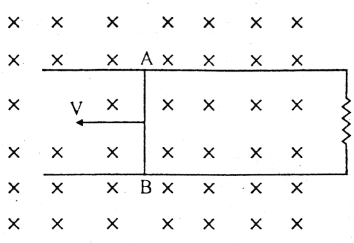
(A) halved (B) quadrupled (C) unchanged (D) doubled

Ans (D)

26. A magnetic needle has a magnetic moment of 5×10^{-2} Am^2 and moment of inertia 8×10^{-6} kgm^2. It has a period of oscillation of 2 s in a magnetic field $\vec{B}$. The magnitude of magnetic field is approximately
(A) 3.2×10^{-4} T (B) 1.6×10^{-4} T (C) 0.8×10^{-4} T (D) 0.4×10^{-4} T
Ans (B)

27. A toroid has 500 turns per metre length. If it carries a current of 2A, the magnetic energy density inside the toroid is
(A) 6.28 J/m^3 (B) 0.628 J/m^3 (C) 3.14 J/m^3 (D) 0.314 J/m^3
Ans (B)

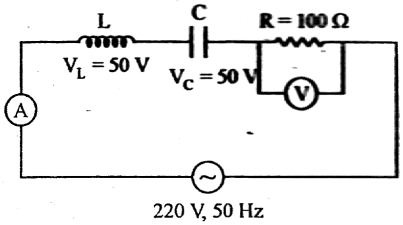
28. Consider the situation given in figure. The wire AB is slid on the fixed rails with a constant velocity. If the wire AB is replaced by a semicircular wire, the magnitude of the induced current will
(A) decrease
(B) increase
(C) increase or decrease depending on whether the semicircle bulges towards the resistance or away from it
(D) remain same



Ans (D)

29. The frequency of an alternating current is 50 Hz. What is the minimum time taken by current to reach its peak value from rms value?
(A) 0.02 s (B) 5×10^{-3} s (C) 10×10^{-3} s (D) 2.5×10^{-3} s
Ans (B)

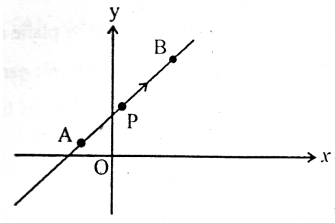
30. The readings of ammeter and voltmeter in the following circuit are respectively
(A) 2.7 A, 220 V
(B) 1.2 A, 120 V
(C) 2.2 A, 220 V
(D) 1.5 A, 100 V



Ans (C)

31. Two particles which are initially at rest move towards each other under the action of their mutual attraction. If their speeds are v and 2 v at any instant, then the speed of center of mass of the system is,
(A) 1.5 v (B) 2v (C) v (D) zero
Ans (D)

32. A particle is moving uniformly along a straight line as shown in the figure. During the motion of the particle from A to B, the angular momentum of the particle about 'O'
(A) remains constant
(B) increases
(C) first increases then decreases
(D) decreases



Ans (A)

33. A satellite is orbiting close to the earth and has a kinetic energy K. The minimum extra kinetic energy required by it to just overcome the gravitation pull of the earth is

(A) $\sqrt{3}K$ (B) K (C) $2\sqrt{2}K$ (D) 2 K

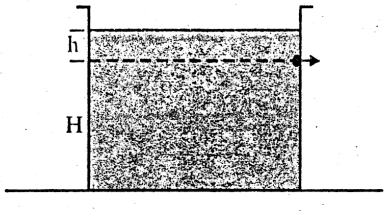
Ans (B)

34. A wire is stretched such that its volume remains constant. The Poission's ratio of the material of the wire is

(A) 0.25 (B) 0.50 (C) – 0.25 (D) – 0.50

Ans (B)

35. A cylindrical container containing water has a small hole at height of H = 8 cm from the bottom and at a depth of 2 cm from the top surface of the liquid. The maximum horizontal distance travelled by the water before it hits the ground (x) is



(A) 4 cm

(B) 8 cm

(C) 6 cm

(D) $4\sqrt{2}$ cm

Ans (B)

36. An inductor of inductance L and resistor R are joined together in series and connected by a source of frequency ω. The power dissipated in the circuit is

(A) $\dfrac{V}{R^2+\omega^2L^2}$ (B) $\dfrac{R^2+\omega^2L^2}{V}$ (C) $\dfrac{V^2R}{\sqrt{R^2+\omega^2L^2}}$ (D) $\dfrac{V^2R}{R^2+\omega^2L^2}$

Ans (D)

37. An electromagnetic wave is travelling in x-direction with electric field vector given by, $\vec{E}_y = E_0 \sin(kx-\omega t)\hat{j}$. The correct expression for magnetic field vector is

(A) $\vec{B}_y = \dfrac{E_0}{C}\sin(kx-\omega t)\hat{j}$ (B) $\vec{B}_y = E_0 C\sin(kx-\omega t)\hat{j}$

(C) $\vec{B}_z = \dfrac{E_0}{C}\sin(kx-\omega t)\hat{k}$ (D) $\vec{B}_z = E_0 C\sin(kx-\omega t)\hat{k}$

Ans (C)

38. The phenomenon involved in the reflection of radio-waves by ionosphere is similar to

(A) dispersion of light by water molecules during the formation of a rainbow

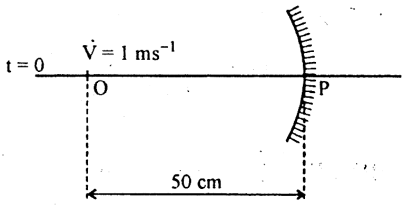
(B) reflection of light by plane mirror

(C) scattering of light by air particles

(D) total internal reflection of light in air during a mirage

Ans (D)

39. A Point object is moving uniformly towards the pole of a concave mirror of focal length 25 cm along its axis as shown below. The speed of the object is 1 ms^{-1}. At t = 0, the distance of the object from the mirror is 50 cm. The average velocity of the image formed by the mirror between time t = 0 and t = 0.25 s is



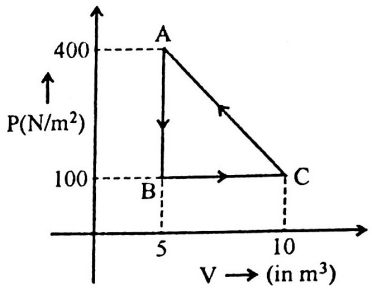
(A) zero
(B) 40 cm s^{-1}
(C) infinity
(D) 20 cm s^{-1}

Ans (C)

40. A certain prism is found to produce a minimum deviation of 38°. It produces a deviation of 44° when the angle of incidence is either 42° or 62°. What is the angle of incidence when it is undergoing minimum deviation?
(A) 49° (B) 30° (C) 60° (D) 40°
Ans (A)

41. An aluminium sphere is dipped into water. Which of the following is true?
(A) Buoyancy in water at 0 °C will be same as that in water at 4 °C
(B) Buoyancy will be less in water at 0 °C than that in water at 4 °C
(C) Buoyancy may be more or less in water at 4 °C depending on the radius of the sphere
(D) Buoyancy will be more in water at 0 °C than that in water at 4 °C
Ans (B)

42. A thermodynamic system undergoes a cyclic process ABC as shown in the diagram. The work done by the system per cycle is



(A) –750 J
(B) 750 J
(C) 1250 J
(D) – 1250 J

Ans (B)

43. One mole of O_2 gas is heated at constant pressure starting at 27 °C. How much energy must be added to the gas as heat to double its volume?
(A) 750 R (B) Zero (C) 1050 R (D) 450 R
Ans (C)

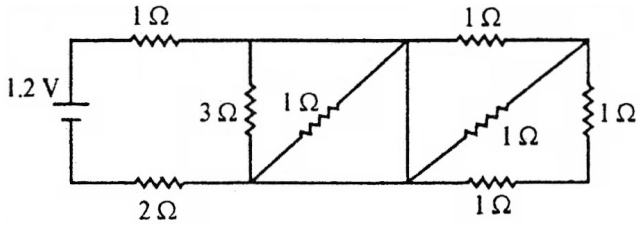
44. A piston is performing S.H.M. in the vertical direction with a frequency of 0.5 Hz. A block of 10 kg is placed on the piston. The maximum amplitude of the system such that the block remains in contact with the piston is
(A) 1.5 m (B) 1 m (C) 0.1 m (D) 0.5 m
Ans (B)

45. The equation of a stationary wave is $y = 2\sin\left(\frac{\pi x}{15}\right)\cos(48\pi t)$. The distance between a node and its next antinode is

(A) 22.5 units (B) 7.5 units (C) 30 units (D) 1.5 units

Ans (B)

46. In the given circuit, the current through 2 Ω resistor is



(A) 0.4A
(B) 0.2A
(C) 0.1A
(D) 0.3A

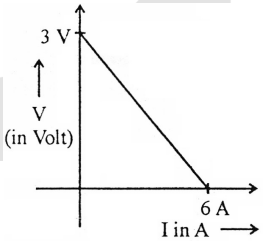
Ans (D)

47. Kichhoff's junction rule is a reflection of

(A) conservation of momentum
(B) conservation of current density vector
(C) conservation of charges
(D) conservation of energy

Ans (C)

48. The variation of terminal potential difference (V) with current flowing through as cell is as shown



The emf and internal resistance of the cell are

(A) 6 V, 2 Ω (B) 3 V, 2 Ω (C) 6 V, 0.5 Ω (D) 3 V, 0.5 Ω

Ans (D)

49. In a potentiometer experiment, the balancing point with a cell is at a length 240 cm. On shunting the cell with a resistance of 2 Ω, the balancing length becomes 120 cm. The internal resistance of the cell is

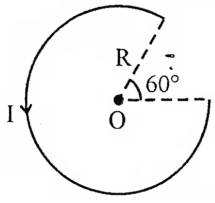
(A) 1 Ω (B) 4 Ω (C) 0.5 Ω (D) 2 Ω

Ans (D)

50. The magnetic field at the centre 'O' in the given figure is

(A) $\frac{3}{10}\frac{\mu_0 I}{R}$ (B) $\frac{7}{14}\frac{\mu_0 I}{R}$

(C) $\frac{\mu_0 I}{12R}$ (D) $\frac{5}{12}\frac{\mu_0 I}{R}$



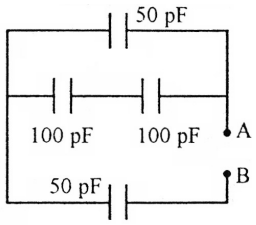
Ans (C)

51. Two metal plates are separated by 2 cm. The potentials of the plates are − 10 V and + 30 V. The electric field between the two plates is

(A) 200 V/m (B) 500 V/m (C) 3000 V/m (D) 1000 V/m

Ans (A)

52. The equivalent capacitance between A and B is,



(A) 150 pF

(B) 50 pF

(C) 300 pF

(D) $\frac{100}{3}$ pF

Ans (D)

53. A capacitor of capacitance C charged by an amount Q is connected in parallel with an uncharged capacitor of capacitance 2C. The final charges on the capacitors are

(A) $\frac{Q}{3},\frac{2Q}{3}$ (B) $\frac{Q}{2},\frac{Q}{2}$ (C) $\frac{Q}{5},\frac{4Q}{5}$ (D) $\frac{Q}{4},\frac{3Q}{4}$

Ans (A)

54. Though the electron drift velocity is small and electron charge is very small, a conductor can carry an appreciably large current because

(A) electron number density depends on temperature

(B) electron number density is very large

(C) relaxation time is small

(D) drift velocity of electron is very large

Ans (B)

55. Masses of three wires of copper are in the ration 1 : 3 : 5 and their lengths are in the ratio 5 : 3 : 1. The ratio of their electrical resistance are

(A) 1 : 15 : 125 (B) 1 : 3 : 5 (C) 125 : 15 : 1 (D) 5 : 3 : 1

Ans (C)

56. A certain charge 2Q is divided at first into two parts q_1 and q_2. Later the charges are placed at a certain distance. If the force of interaction between two charges is maximum then $\frac{Q}{q_1} =$

(A) 1 (B) 4 (C) 0.5 (D) 2

Ans (A)

57. A particle of mass m and charge q is placed at rest in uniform electric field E and then released. The kinetic energy attained by the particle after moving a distance y is

(A) qEy (B) qEy^2 (C) q^2Ey (D) qE^2y

Ans (A)

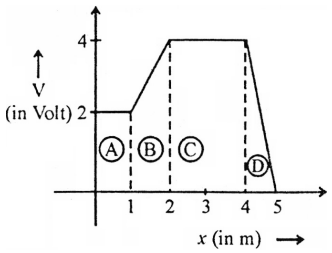
58. An electric dipole is kept in non-uniform electric field. It generally experiences

(A) a torque but not a force (B) a force and torque

(C) neither a force nor a torque (D) a force but not a torque

Ans (B)

59. The figure gives the electric potential V as a function of distance through four regions on x-axis. Which of the following is true for the magnitude of the electric field E in these regions?



(A) $E_B = E_D$ and $E_A < E_C$
(B) $E_A > E_B > E_C > E_D$
(C) $E_A < E_B < E_C < E_D$
(D) $E_A = E_C$ and $E_B < E_D$

Ans (D)

60. A system of two charges separated by a certain distance apart stores electrical potential energy. If the distance between them is increased, the potential energy of the system,
(A) may increase or decrease
(B) increases in any case
(C) remains the same
(D) decreases in any case

Ans (A)

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