CBSE Sample Paper 13

Class XII Exam 2022-23

Physics

Time: 3 Hours **Max. Marks: 70**

General Instructions:

1. There are 35 questions in all. All questions are compulsory.
2. This question paper has five sections: Section A, Section B, Section C, Section D and Section E. All the sections are compulsory.
3. Section A contains eighteen MCQ of 1 mark each, Section B contains seven questions of two marks each, Section C contains five questions of three marks each, section D contains three long questions of five marks each and Section E contains two case study based questions of 4 marks each.
4. There is no overall choice. However, an internal choice has been provided in section B, C, D and E. You have to attempt only one of the choices in such questions.
5. Use of calculators is not allowed.

SECTION-A

1. View Solution The electric field at a distance 2 cm from the centre of a hollow spherical conducting shell of radius 4 cm having a charge of 2×10^{-3} C on its surface, is

(a) zero (b) 1.1×10^{10} V-m^{-1} (c) 4.5×10^{-10} V-m^{-1} (d) $4.5 \times 10^{+10}$ V-m^{-1}

2. View Solution A parallel plate capacitor is made by stacking n equally spaced plates connected alternatively. If capacitance between any two adjacent plates is C, then the resultant capacitance is

(a) C (b) nC (c) $(n-1)C$ (d) $(n+1)C$

3. View Solution Electron-volt (eV) is the measure of

(a) charge (b) potential difference (c) current (d) energy

4. View Solution A particle of mass m and charge q moves with a constant velocity v along the positive x -direction. It enters a region containing a uniform magnetic field B directed along the negative z-direction, extending from $x = a$ to $x = b$. The minimum value of v required, so that the particle can just enter the region of $x > b$ is

(a) $\frac{qbB}{m}$ (b) $\frac{qaB}{m}$ (c) $\frac{q(b-a)B}{m}$ (d) $\frac{q(b+a)B}{2m}$

5. View Solution The magnetic lines of force inside a bar magnet

(a) do not exist

(b) are from north-pole to south-pole of the magnet

(c) are from south-pole to north-pole of the magnet

(d) depend upon the area of cross-section of the bar magnet

Click View Solution Button View Solution to See Solution

6. If a wire of length 2 m is moving with a velocity of $1\ m\text{-}s^{-1}$ perpendicular to a magnetic field of 0.5 T, then E.M.F. induced in the wire will be
View Solution
(a) 0.2 V (b) 0.5 V (c) 1 V (d) 2 V

7. In a purely resistive AC circuit, the current
View Solution
(a) is in phase with the e.m.f.
(b) leads the e.m.f. by a difference of π radians phase
(c) leads the e.m.f. by a phase difference of $\pi/2$ radians
(d) lags behind the e.m.f. by phase difference of $\pi/4$ radians

8. The frequency of X-rays is
View Solution
(a) 10^{12} Hz (b) $10^{14}\ H_z$ (c) 10^{16} Hz (d) 10^{18} Hz

9. When a ray of light enters a glass slab its wavelength
View Solution
(a) decreases (b) increases
(c) remains unchanged (d) data are not complete

10. The core of a transformer is laminated, so as to
View Solution
(a) make it light weight (b) make it robust and strong
(c) increase the secondary voltage (d) reduce energy loss due to eddy current

11. Cathode rays can be deflected by
View Solution
(a) electric field (b) magnetic field (c) both types of fields (d) none of these fields

12. A pure semiconductor behaves slightly as a conductor at
View Solution
(a) low temperature (b) high temperature (c) room temperature (d) both (a) and (b)

13. In a nuclear reactor, fast moving neutrons are slowed down by passing them through
View Solution
(a) oil (b) vacuum (c) heavy water (d) kerosene

14. The potential barrier, in the depletion layer, is due to
View Solution
(a) ions (b) holes (c) electrons (d) forbidden band

15. The electrical resistance of a healthy man is
View Solution
(a) 50,000 Ω (b) 10,000 Ω (c) 1,000 Ω (d) 10 Ω

16. **Assertion :** A charge, whether stationary or in motion produces a magnetic field around it.
View Solution
Reason : Moving charges produce only electric field in the surrounding space.
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Assertion is incorrect but Reason is correct.

17. View Solution
Assertion : If a compass needle be kept at magnetic north pole of the earth the compass needle may stay in any direction.
Reason : Dip needle will stay vertical at the north pole of earth.
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Assertion is incorrect but Reason is correct.

18. View Solution
Assertion : No power loss associated with pure capacitor in ac circuit.
Reason : No current is flowing in this circuit.
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Assertion is incorrect but Reason is correct.

SECTION-B

19. View Solution
Is the steady electric current the only source of magnetic field? Justify your answer.

20. View Solution
Magnetic field lines can be entirely confined with the core of toroid, but not within a straight solenoid, why?

21. View Solution
How are infrared waves produced? Why are these referred to as heat waves? Write their one important use.

OR

State two properties of electromagnetic waves.

22. View Solution
A concave lens of refractive index 1.5 is immersed in a medium of refractive index 1.65 what is the nature of the lens?

23. View Solution
Why are two bulbs lighting the same walls considered as incoherent sources? How do their intensities add up?

OR

When a tiny circular obstacle is placed in the path of light from a distant source, a bright spot is seen at the centre of shadow of the obstacle. Explain.

24. View Solution
Determine the distance of closest approach when an alpha particle of kinetic energy 4.5 MeV strikes a nucleus of $Z = 80$, stops and reverse its direction.

Click View Solution Button to ... Solution

25. Distinguish between 'Intrinsic' and 'extrinsic' semiconductors?

View Solution

SECTION-C

26. A charge Q is given to three capacitors C_1, C_2 and C_3 connected in parallel. Determine the charge on each.

View Solution

27. How are electromagnetic waves produced? What is the source of energy of these waves? Write mathematical expressions for electric and magnetic fields of an electromagnetic wave propagating along the z-axis. Write any two important properties of electromagnetic waves.

View Solution

28. How will you explain twinkling of stars?

View Solution

OR

Describe the formation of image by a concave lens.

29. Briefly describe proton-neutron hypothesis of nuclear composition.

View Solution

OR

What are uncontrolled and controlled chain reactions?

30. Describe briefly, with the help of a diagram, the role of the two important process involved in the formation of a $p-n$ junction.

View Solution

SECTION-D

31. 1. Define electric intensity.

View Solution 2. Derive an expression for electric intensity at a point situated on the axis of electric dipole.

OR

A regular hexagon of side 10 cm has charge 5 μC at each of its vertices. What is the resultant potential at the centre of the hexagon?

32. Discuss the motion of a charged particle in a uniform magnetic field with initial velocity (1) parallel to the field, (2) perpendicular to the magnetic field and (3) at an arbitrary angle with the field direction.

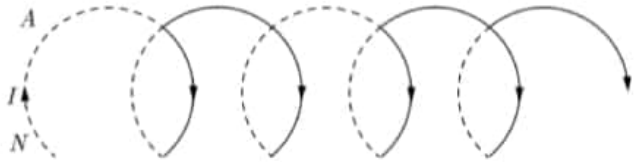
View Solution

OR

(i) State Ampere's circuital law. Use this law to obtain the expression for the magnetic field inside an air cored toroid of average radius r, having n turns per unit length and carrying a steady current I.

(ii) An observer to the left of a solenoid of N turns each of cross-section area A observes that a steady current I in it flows in the clockwise direction. Depict the magnetic field lines due

to the solenoid specifying its polarity and show that it acts as a bar magnet of magnetic moment $m = NIA$.



33. Give postulates of Bohr's theory. Explain hydrogen spectrum on the basis of Bohr's theory.

View Solution

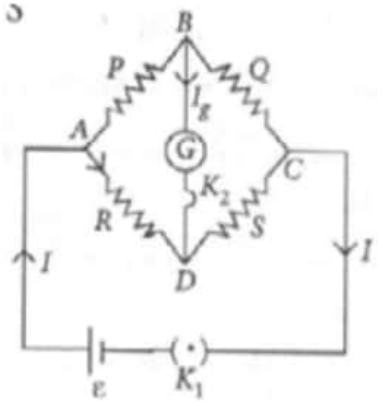
OR

What is H_α line in the emission spectrum of hydrogen atom obtained? Calculate the frequency of the photon emitted during this transition.

SECTION-E

34. Wheatstone bridge is an arrangement of four resistances P, Q, R and S connected as shown in the figure. Their values are so adjusted that the galvanometer G shows no deflection. The bridge is then said to be balanced when this condition is achieved. In the setup shown here, the points B and D are at the same potential and it can be shown that $\frac{P}{Q} = \frac{R}{S}$.

View Solution



This is called the balancing condition. If any three resistances are known, the fourth can be found. The practical form of Wheatstone bridge is slide wire bridge or meter bridge. Using this the unknown resistance can be determined as $S = \left(\frac{100 - l}{l}\right) \times R$, where l is the balancing length of the Meter bridge.

(i) In a Wheatstone bridge circuit, $P = 5\,\Omega$, $Q = 6\,\Omega$, $R = 10\,\Omega$ and $S = 5\,\Omega$.What is the value of additional resistance to be used in series with S, so that the bridge is balanced?

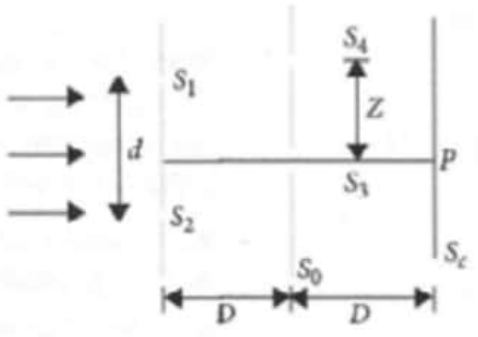
(ii) What is the condition when a wheatstone bridge consisting of four arms of resistances P , Q, R, S is most sensitive?

(iii) When a metal conductor connected to left gap of a meter bridge is heated, the balancing point

OR

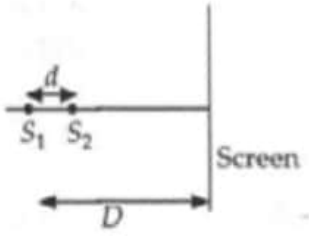
(iv) In a meter bridge experiment, the ratio of leftgap resistance to right gap resistance is 2 : 3. What will be the balance point from left?

35. View Solution Consider the situation shown in figure. The two slits S_1, and S_2, placed symmetrically around the central line are illuminated by monochromatic light of wavelength λ. The separation between the slits is d. The light transmitted by the slits falls on a screen S_0 placed at a distance D from the slits. The slits S_3, is at the central line and the slit S_4, is at a distance z from S_3. Another screen S_c. is placed a further distance D away from S_0.



(i) Find the path difference if $z = \frac{\lambda D}{2d}$.

(ii) Two coherent point sources S_1 and S_2 are separated by a small distance d as shown in figure. What type of the fringes obtained on the screen?



(iii) In the case of light waves from two coherent sources S_1, and S_2, there will be constructive interference at an arbitrary point P, what should be the path difference $S_1P - S_2P$ is for this to occur?

OR

(iv) Two monochromatic light waves of amplitudes $3A$ and $2A$ interfering at a point have a phase difference of 60°. The intensity at that point will be proportional to xA^2. What is the value of x.

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