CBSE Sample Paper - 2015

Class – 12th

Subject: Physics (theory)

Time: Three Hours   **Full Marks: 70**

General Instructions:
- ❖ **All questions are compulsory.**
- ❖ **There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all questions of five marks. You have to attempt only one the choice in such questions.**
- ❖ **Question numbers 1 to 8 are very short answer type questions, carrying one mark each.**
- ❖ **Questions numbers 9 to 16 are short answer type questions carrying two marks each.**
- ❖ **Question numbers 17 to 25 are also short answer type questions, carrying 3 marks each.**
- ❖ **Question numbers 26 value based type question, carrying four marks.**
- ❖ **Question numbers 27 to 29 are long answer type questions, carrying five marks each.**
- ❖ **Use of calculators is not permitted. However, you may use log tables, if necessary.**
- ❖   **You may use the following values of physical constants wherever necessary:**
  $C = 3 \times 10^8$ ms^{-1} , h = 6.626×10^{-34} Js , e = 1.602×10^{-19} C
 $\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1} , $1/4\pi\varepsilon_0 = 9 \times 10^9$ Nm^2 C^{-2}

1. **Name the characteristics of electromagnetic waves that (i) increases (ii) remains constant. In the electromagnetic spectrum as one moves from radio wave region towards ultraviolet region.**
2. **State and explain the conditions for interference of light waves.**
3. **If potential difference applied across a conductor is increased from V to 2V, how the drift velocity of electron change?**
4. **How deep will a 4m deep tank appear when seen in air due to optical illusion? Refractive index of water is 4/3.**
5. **What type of lens is an air bubble inside water?**
6. **Define the term activity of a radioactive substance. State its SI units.**
7. **An electron is moving along negative X-axis in the presence of uniform magnetic field along positive Y-axis. What is the direction of force acting on it?**
8. **What is de-Broglie wavelength of an atom at absolute temperature TK?**

www.cbseguess.com

Other Educational Portals
www.icseguess.com | www.ignouguess.com | www.indiaguess.com | www.magicsense.com | www.niosguess.com |
www.iitguess.com | www.aipmtguess.com

9. Draw block diagram of a simple amplitude modulation, explaining briefly how amplitude modulation is achieved.
10. Draw ray diagram and depict the behaviour of magnetic field lines near a bar of:
    i.   Copper
    ii. Aluminium
    iii. Mercury cooled to a very low temperature (4.2K).
11. Define the term potential barrier and depletion region for a p-n junction diode. 2
12. A radioactive material is reduced to 1/16 of its original amount in 4 days. How much material should one begin with so that 4×10^{-3} kg of the material is left after 6 days?
    Or
    Draw a graph showing the variation of potential energy between a pair of nucleons as a function of their separation. Indicate the regions in which nuclear force is :
    (i) Attractive.
    (ii) Repulsive.
13. A galvanometer has a resistance 30Ω and gives a full scale deflection for a current of 2mA. How much resistance and in what way must be connect to convert it into:
    i.   An ammeter of range 0.3 A.
    ii. A voltmeter of range 0.2 V.
14. A uniformly charged conducting sphere of diameter 2.5 m has a surface charge density 100 μC/m^2. Calculate:
    i.   Charge on the sphere and
    ii. Total electric flux passing through the sphere.

15. What happens to the energy stored in a capacitor if after disconnecting the battery, the plates of a charged capacitor are moved farther?
16. Identify the following electromagnetic radiations as per the frequencies given below: (i) 10^{20} Hz (ii) 10^9 Hz
    Write one application of each.
17. (a) Draw the block diagram of a communication system.
    (b) What is meant by detection of a modulated carrier wave? Describe briefly the essential steps for detection.
18. Deduce the laws of reflection from Huygens wave theory.
19. State Kirchhoff's laws for electrical circuits. Use it find the balanced condition of Wheatstone bridge.
    Or
    (a) Establish a relation between current and drift velocity.
    (b) Write Ohm's law in vector form.
20. The given figure shows the experimental setup of a metre bridge. The null point is found to be 60 cm away from the end A with X and Y in position as shown. When a resistance of 15 ohms is connected in series with Y, the null point is found to shift by 10 cm towards the end A of the wire. Find the position of null point if a resistance of 30 ohms were connected in parallel with Y.
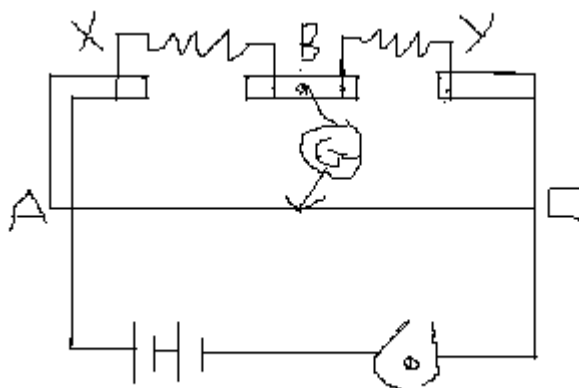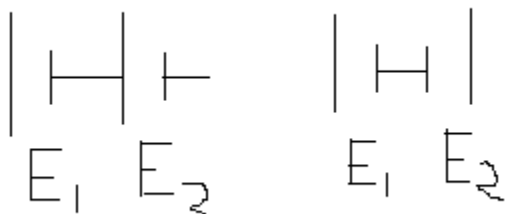
Or

Why is a potentiometer preferred over a voltmeter for determining the emf of a cell?
Two cells of E_1 and E_2 are connected together in two ways shown here.
The balanced points in a given potentiometer experiment for these two combinations of cells are found to be at 351.0 cm and 70.2 cm respectively. Calculate the ratio of the emfs of the two cells.

21. The work function of a metal is 2.14 eV. When light of frequency 6×10^{14} Hz is incident on the metal surface, photoemission of electrons occurs. What is the :
    (a) Maximum kinetic energy of the emitted electrons?
    (b) Stopping potential and
    (c) Maximum speed of emitted electrons?
22. Derive Expression for self inductance of a long air cored solenoid of length l, cross sectional area A and having number of turns N.
23. With help of an example, explain how the neutron to proton ratio changes during α-decay of a nucleus.
24. At What angle should a ray of light be incident on the face of a prism of refracting angle 60^0 so that it just suffers total internal refraction at the other face? The refracting index of prism is 1.524.
25. Distinguish the magnetic properties of dia, para and ferromagnetic substances in term of:
    i. Susceptibility

www.cbseguess.com

Other Educational Portals
www.icseguess.com | www.ignouguess.com | www.indiaguess.com | www.magicsense.com | www.niosguess.com |
www.iitguess.com | www.aipmtguess.com

  ii. **Magnetic permeability**
  iii. **Coercivity**
Give an example of each of these materials. Draw the field lines due to an external magnetic field near a (a) diamagnetic (b) Paramagnetic substance.

26. **Raman's Father bought a new flat in a multistory building. One day he went to visit the building and flat. There, he found that there is no provision for preventing the damage caused by lighting. He told about it to his father. They meet to the secretary of the building society and explained them about lightning strike. Raman told them the method to protect building from lightning.**
(a) **What values were displayed by Raman?**
(b) **Explain the method to protect building from lightning.**

27. **With the help of a circuit diagram, explain how an n-p-n transistor can be used to produce self sustained oscillation in an oscillator. 5**
Or
A student has to study the input and output characteristics of a n-p-n silicon transistor in the Common Emitter configuration. What kind of a circuit arrangement should she use for this purpose? Draw the typical shape of input characteristics likely to be obtained by her. What do we understand by the cut off, active and saturation states of the transistor? In which of these states does the transistor not remain when being used as a switch?

28. **Define mutual inductance and give its SI unit. Derive expression for the mutual inductance of two long coaxial solenoids of same length wound over the other. 5**
Or
(a) **A rectangular coil of N-turns, area A is held in a uniform magnetic field B. If the coil is rotated at a steady angular speed ω deduce an expression for the induced emf in the coil at any instant of time.**
(b) **Explain how does the emf vary when the coil turns through an angle of 2Π? What is the instantaneous value of induced emf when the plane of the coil makes an angle of 60° with the magnetic lines.**

29. **Draw a ray diagram for formation of image of a point object by a thin double convex lens having radii of curvature R_1 and R_2. Hence, derive lens maker's formula for a double convex lens. 5**
Or
With help of a ray diagram, show the formation of image of a point object by refraction of light at a spherical surface separating two media of refractive indices μ_1 and μ_2 ($\mu_2 > \mu_1$) respectively. Using this diagram, derive the relation
$\mu_2/v - \mu_1/u = \mu_2 - \mu_1/R$

www.cbseguess.com

Other Educational Portals
www.icseguess.com | www.ignouguess.com | www.indiaguess.com | www.magicsense.com | www.niosguess.com | www.iitguess.com | www.aipmtguess.com

www.cbseguess.com

Other Educational Portals
www.icseguess.com | www.ignouguess.com | www.indiaguess.com | www.magicsense.com | www.niosguess.com |
www.iitguess.com | www.aipmtguess.com