

# CBSE Sample Paper 7

## **General Instruction:**

1. Answer all questions
2. Internal choices are provided for some questions
3. Question numbers 1 to 8 are very short answer questions and carry 1 mark each.
4. Question numbers 8 to 18 are short answer questions and carry 2 marks each.
5. Question numbers 19 to 27 are also short answer questions and carry 3 marks each.
6. Question numbers 28 to 30 are long answer questions and carry 5 marks each.
7. Use log tables if necessary.
8. There is no overall choice. However, an internal choice has been provided in questions of five marks each. You have to attempt only one of the choices in such questions.

9. You may use the following values of physical constants wherever necessary:

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$e = 1.602 \times 10^{-19} \text{ C}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ TmA}^{-1}$$

$$\text{Mass of electron } m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$\text{Mass of neutron } m_n = 1.675 \times 10^{-27} \text{ kg}$$

$$\text{Boltzmann's constant } k = 1.381 \times 10^{-23} \text{ JK}^{-1}$$

$$\text{Avogadro's number } N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$\text{Radius of earth} = 6400 \text{ km}$$

### **Question 1**

What is the ratio of radii of the orbits corresponding to first excited state and ground state in a hydrogen atom ?

### **Question 2**

Define 1mH Inductance ?

### **Question 3**

How does the intensity of magnetization of paramagnetic sample vary with temperature ?

### **Question 4**

A wire of resistance  $4R$  is bent in the form of a circle. What is the effective resistance between the ends of a diameter ?

### **Question 5**

Find the shortest wavelength of the Lyman series ?

**Question 6**

Draw symbolic diagrams for p-n-p and n-p-n transistor?

**Question 7**

State Wien's displacement Law

**Question 8**

State the conditions for the phenomenon of total internal reflection to occur.?

**Question 9**

The energy of the photon is  $10\text{eV}$ . Calculate following

- i) *Momentum*
- ii) *Wavelength of the photon*
- iii) *Rest mass and Kinetic mass of the photon*

**Question 10**

The radii of two concentric spherical conducting shell are  $R$  and  $r$  ( $R > r$ ). The charge on the outer shell is  $Q$ . What will be the charge on inner shell which is connected to the earth?

**Question 11**

What is Laser radiation ? And explain its usage in medicine and surgery?

**Question 12**

A conductor of length ' $l$ ' connected to a D.C source of potential  $V$ . If the length of the conductor is tripled by stretching it keeping ' $V$ ' constant. Explain how do the following factors vary in the conductor?

- (1) Drift speed of electrons
- (2) Resistance
- (3) Resistivity

**Question 13**

You are given  $n$  resistors each of resistance  $R$ . How will you combine them to get maximum and minimum resistance. Calculate also the ratio of minimum to maximum resistance

**Question 14**

Arrange the following electromagnetic radiations in descending order of their frequencies :

- (i) Microwave

- (ii) Radio wave
- (iii) X-rays
- (iv) Gamma rays

Write two uses of any two of these.

#### Question 15

What are eddy currents ? How are these produced? In what sense are eddy currents considered undesirable in a transformer

#### Question 16

How will the focal length of convex lens change, when

- (1) monochromatic light is used in place of white light
- (2) lens is immersed in water?

#### Question 17

What are photoelectric cells? Explain the working of Photovoltaic cell

#### Question 18

Charges of magnitudes  $8Q$  and  $-4Q$  are located at points  $(2c,0,0)$  and  $(0,9c,0)$ . Find the ratio of the flux of electric field, due to these charges, through concentric spheres of radii  $3c$  and  $10c$  centered at the origin.

#### Question 19

What is electric dipole? Derive an expression for the electrostatic potential at a point on the axis of the dipole?

#### Question 20

Two parallel plate capacitor  $20\mu\text{F}$  and  $30\mu\text{F}$  are charged to  $30\text{ V}$  and  $20\text{ V}$  respectively. Now they are connected in parallel, Find out following

- 1) The common Potential difference
- 2) The charge on each capacitor initially and after they are connected in parallel

#### Question 21

A coil of mean area  $500\text{ cm}^2$  and  $2000$  turns is held perpendicular to the uniform magnetic field of strength  $4 \times 10^{-4}\text{ Wbm}^{-2}$ . The coil is turned through  $180^\circ$  in  $.1\text{ sec}$ . Calculate the average induced EMF

#### Question 22

State the laws of Photoelectric effect. Explain it on the basis of Einstein equation?

#### Question 23

A  $10\mu\text{F}$  capacitor is charged by a  $30\text{V d.c}$  and then connected across the uncharged  $50\mu\text{F}$  capacitor. Calculate the final potential difference across the combination and initial & final energies.

**Question 24**

- Write Kirchhoff's 's law of radiation
- State Stefan's law of thermal radiation

**Question 25**

In L-R series circuit, the potential difference across the inductor 'L' and the resistor 'R' are 120 V and 90 V respectively and rms value of current is 3 A

- (1) Calculate r.m.s voltage across the circuit.
- (2) Is the algebraic sum of the voltage across two components more than the applied voltage? If yes, explain the reason
- (3) Calculate the phase angle between the voltage and current

**Question 26**

A long straight wire of a circular cross-section of radius  $b$  carries a steady current  $I$ . The current is uniformly distributed across the cross-section. Apply Ampere's circuital law to calculate the magnetic field at a point 'r' in the region for

- (i)  $r < b$
- (ii)  $r > b$

**Question 27**

What is polaroid? How is plane polaroid light obtained with its help? How will you use it to distinguish between unpolarised light and plane polarized light?

**Question 28**

What is interference of light? Write two essential conditions for sustained interference fringes. Draw a graph to show the variation of intensity versus position on screen in YDSE. When (a) both the slits are open ( b) When one slit is closed .What is effect on interference pattern when screen is moved closed to slit.

OR

- i) The focal lengths of the objective and the eyepiece of an astronomical telescope are 200 cm and 5cm respectively. What is the magnifying power if the final image is formed at infinity?
- ii) You are given three convex lens of focal length 20 cm, 2 cm and 3 cm which two lens should be used for the construction of a telescope in order to obtain maximum magnification?

**Question 29**

- a) With the help of the circuit diagram explain the working principle of a transistor amplifier as an oscillator.
- (b) Distinguish between a conductor, a semiconductor and an insulator on the basis of energy band diagrams

**Question 30**

Explain with the help of a labeled diagram the working principle of a cyclotron. Show that cyclotron frequency does not depend on the speed of the particle

OR

Explain briefly, with the help of a labeled diagram the basic principle of working of a.c. generator. In an a.c. generator coil of  $N$  turns and area  $A$  is rotated at  $\omega$  rotation per second in a uniform magnetic field  $B$ . Write the expression of the emf produced.

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