

<b>COMMON HALF YEARLY EXAMINATION - 2023</b>	Reg. No.	1	2	8	1	0	1	0
	<b>XII - PHYSICS</b>							
Time Allowed : 3.00 Hrs.								

## Part - I

15 × 1 = 15

## I. Choose the correct answer:

- In a uniformly charged spherical shell of radius  $r$ , the electric field at the centre of the shell
  - zero
  - non-zero constant
  - varies with  $r$
  - inversely varies with  $r$
- The colour code sequence of a resistor is green, blue orange and gold. The value of resistance with tolerance is
  - $46 \text{ k}\Omega \pm 10\%$
  - $56 \text{ k}\Omega \pm 5\%$
  - $48 \text{ k}\Omega \pm 15\%$
  - $58 \Omega \pm 5\%$
- A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of
  - each of them increases
  - each of them decreases
  - copper increases and germanium decreases
  - copper decreases and germanium increases
- A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly
  - $1.0 \text{ Am}^2$
  - $1.2 \text{ Am}^2$
  - $0.5 \text{ Am}^2$
  - $0.8 \text{ Am}^2$
- A step down transformer reduces 220 V to 11 V. The primary draws 5 A current and secondary supplies 90 A. The efficiency of the transformer is
  - 90%
  - 33%
  - 20%
  - 44%
- In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference between the voltage and current in the circuit is
  - $\frac{\pi}{4}$
  - $\frac{\pi}{2}$
  - $\frac{\pi}{6}$
  - zero
- Fraunhofer lines are an example of \_\_\_\_\_ spectrum
  - line emission
  - line absorption
  - band emission
  - band absorption
- The critical angle for diamond (refractive index = 2) is
  - about  $20^\circ$
  - $60^\circ$
  - $45^\circ$
  - $30^\circ$
- The speed of light in an isotropic medium depends on
  - its intensity
  - its wavelength
  - the nature of propagation
  - the motion of source w.r.t. medium
- The transverse nature of light is shown in
  - interference
  - diffraction
  - scattering
  - polarisation
- If a photon has velocity  $c$  and frequency  $\nu$ , then which of the following represents its wavelength
  - $\frac{hc}{E}$
  - $\frac{h\nu}{c}$
  - $\frac{h\nu}{c^2}$
  - $h\nu$
- Which of the following shows particle nature of light?
  - refraction
  - interference
  - polarization
  - photoelectric effect
- The charge of cathode rays particle is
  - positive
  - negative
  - neutral
  - not defined
- The zener diode is primarily used as
  - rectifier
  - amplifier
  - oscillator
  - voltage regulator
- The materials used in Robotics are
  - aluminium and silver
  - silver and gold
  - copper and gold
  - steel and aluminium

## Part - I

6 x 2 = 12

2. Answer any 6 questions. (Q.No.24 is compulsory)

16. Define capacitance of a capacitor. Give its unit.
17. Why Nichrome is used as heating element in electrical appliances?
18. State Biot-Savart's law.
19. Define magnetic flux. Give its unit.
20. Give two uses each of (i) IR radiation (ii) Microwaves
21. Discuss about Nicol prism.
22. What is a photo cell? Mention the different types of photo cells.
23. Define Curie.
24. Pure water has refractive index 1.33. What is the speed of light through it?

## Part - II

5 x 3 = 15

III. Answer any 6 questions. (Q.No.33 is compulsory)

25. Obtain an expression for electric potential at a point due to a point charge.
26. State Kirchhoff's first and second rule.
27. How will you convert a moving coil galvanometer into ammeter?
28. Mention the properties of electromagnetic waves.
29. What is total internal reflection? Write the two conditions for total internal reflection.
30. Mention the application of photo cells.
31. What are the properties of nuclear force?
32. Draw the circuit diagram of a full wave rectifier and draw the input and output waveform.
33. An electric power of 2 MW is transmitted to a place through transmission lines of total resistance  $R = 40 \Omega$  at a voltage of 10 kV. Calculate the power loss during transmission.

## Part - IV

5 x 5 = 25

IV. Answer all the questions.

34. a) Obtain lens maker's formula. (OR)
- b) Obtain the expression for electric field due to an infinitely long charged wire.
35. a) How the emf of two cells are compared using potentiometer? (OR)
- b) Derive an expression for the force between two parallel current carrying conduction.
36. a) Explain the construction and working of a transformer. (OR)
- b) i) Mention the uses of X-rays.
- ii) Calculate the momentum of an electron with kinetic energy 2 eV.
37. a) Explain the types of absorption spectrum. (OR)
- b) State and prove De Morgan's first and second theorem.
38. a) i) Differentiate interference and diffraction.
- ii) A diffraction grating consists of 4000 slits per centimeter. It is illuminated by a monochromatic light. The second order depression maximum is produced at an angle of  $30^\circ$ . What is the wavelength of light used? (OR)
- b) Explain the spectral series of an hydrogen atom