

# COMMON HALF YEARLY EXAMINATION - 2025

Standard XII

Reg.No.

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A

## PHYSICS

Marks : 70

Time : 3.00 hrs

Part - I

15 x 1 = 15

1. Choose the correct answer:

- Two points A and B are maintained at a potential of 7 V and -4 V are respectively. The work done in moving 50 electrons from A to B is  
a)  $8.80 \times 10^{-17}$  J    b)  $-8.80 \times 10^{-17}$  J    c)  $4.40 \times 10^{-17}$  J    d)  $5.80 \times 10^{-17}$  J
- The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of  $10 \Omega$  is  
a)  $0.2 \Omega$     b)  $0.5 \Omega$     c)  $0.8 \Omega$     d)  $1.0 \Omega$
- A non-conducting charged ring carrying a charge of  $q$ , mass  $m$  and radius ' $r$ ' is rotated about its axis with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is  
a)  $\frac{q}{m}$     b)  $\frac{2q}{m}$     c)  $\frac{q}{2m}$     d)  $\frac{q}{4m}$
- In an oscillating LC circuit, the maximum charge on the capacitor is  $Q$ . The charge on the capacitor when the energy is stored equally between the electric and magnetic fields is  
a)  $\frac{Q}{2}$     b)  $\frac{Q}{\sqrt{3}}$     c)  $\frac{Q}{\sqrt{2}}$     d)  $Q$
- Which of the following electro-magnetic radiations is used for viewing object through fog  
a) micro wave    b) gamma rays    c) X-rays    d) infrared
- For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is  
a)  $30^\circ$     b)  $45^\circ$     c)  $60^\circ$     d)  $90^\circ$
- The transverse nature of light is shown in  
a) interference    b) diffraction    c) scattering    d) polarisation
- The wave associated with a moving particle of mass  $3 \times 10^{-6}$  g, has the same wavelength as an electron moving with a velocity  $6 \times 10^6$  ms $^{-1}$ . The velocity of the particle is  
a)  $1.82 \times 10^{-18}$  ms $^{-1}$     b)  $9 \times 10^{-2}$  ms $^{-1}$   
c)  $3 \times 10^{-31}$  ms $^{-1}$     d)  $1.82 \times 10^{-15}$  ms $^{-1}$
- The ratio between the radius of first three orbits of hydrogen atom is  
a) 1:2:3    b) 2:4:6    c) 1:4:9    d) 1:3:5
- 1 curie is equal to \_\_\_\_\_ becquerel.  
a)  $3.7 \times 10^{10}$  Bq    b)  $7.3 \times 10^{10}$  Bq    c)  $3.7 \times 10^5$  Bq    d)  $7.3 \times 10^5$  Bq
- The frequency range of 3 MHz to 30 MHz is used for  
a) Ground wave propagation    b) Space wave propagation  
c) Sky wave propagation    d) Satellite communication
- The technology used for stopping the brain from processing pain is  
a) Precision medicine    b) Wireless brain sensor  
c) Virtual reality    d) Radiology
- The resistivity value of conductors lies between  
a)  $10^{11} \Omega \text{ m} - 10^{19} \Omega \text{ m}$     b)  $10^{-2} \Omega \text{ m} - 10^{-8} \Omega \text{ m}$   
c)  $10^{-5} \Omega \text{ m} - 10^6 \Omega \text{ m}$     d)  $10^2 \Omega \text{ m} - 10^8 \Omega \text{ m}$

14. The half-life period of Carbon 14 is \_\_\_\_\_.  
 a) 3750 years      b) 5370 years      c) 5730 years      d) 7350 years
15. The formula for current reduction factor of the galvanometer is  
 a)  $G = \frac{NAB}{K}$       b)  $G = \frac{K}{NA}$       c)  $G = \frac{K}{NB}$       d)  $G = \frac{K}{NAB}$

## Part - II

II. Answer any 6 questions. (Q.No.18 is compulsory)

6 x 2 = 12

16. What is polarisation?  
 17. Differentiate electric power and electric energy.  
 18. An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed across the secondary if the transformer is connected to a 230 V AC mains.  
 19. Why are e.m. waves non-mechanical?  
 20. What is Rayleigh's scattering?  
 21. State Huygen's principle.  
 22. What is surface barrier?  
 23. Calculate the radius of  ${}_{79}\text{Au}^{197}$  nucleus. (Given :  $R_0 = 1.2 \times 10^{-15} \text{ m}$ ).  
 24. What are black holes?

## Part - III

III. Answer any 6 questions. (Q.No.27 is compulsory)

6 x 3 = 18

25. Obtain the expression for energy stored in the parallel plate capacitor.  
 26. Differentiate Joule heating effect and Peltier effect.  
 27. A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is  $25 \times 10^{-6} \text{ T}$  then, calculate the current which gives a deflection of  $60^\circ$ .  
 28. Mention the various energy losses in transformer.  
 29. Write down the properties of electro-magnetic waves.  
 30. Obtain the equation for apparent depth.  
 31. Discuss about Nicol prism.  
 32. Calculate the cut-off wavelength and cut-off frequency of X-rays from an X-ray tube of accelerating potential 20,000 V.  
 33. State and prove De-morgan's theorems.

## Part - IV

IV. Answer all the questions.

5 x 5 = 25

34. a) Derive an expression for electrostatic potential due to an electric dipole and discuss the special cases. (OR)  
 b) Derive the equation for angle of deviation produced by a prism and thus obtain the equation for refractive index of material of the prism.  
 35. a) Obtain the condition for bridge balance in Wheatstone's bridge. (OR)  
 b) Discuss about simple microscope and obtain equation for magnification.  
 36. a) Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current using Biot-Savart law. (OR)  
 b) Describe briefly Davisson-Germer experiment which demonstrated the wave nature of electrons.  
 37. a) Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle. (OR)  
 b) Describe the working of nuclear reactor with a block diagram.  
 38. a) Write down Maxwell equations in integral form. (OR)  
 b) Explain the construction and working of a full wave rectifier.