Aakash
Medical | IIT-JEE | Foundations

Time: 3 hrs. **Mock Test Paper for Class-XII** Max. Marks: 70

PHYSICS

Roll No.

GENERAL INSTRUCTIONS

Read the following instructions carefully and follow them:

1. The Question paper consists of parts **I, II, II, and IV**

2. **Part - I** consists of **15 Multiple choice** questions,

3. **Part - II** consists of **9 short answer type** questions carrying **2 marks** each, out of which **6 questions** to be answered

4. **Part - III** consists of **9 short answer type** questions carrying **3 marks** each, out of which **6 questions** to be answered

5. **Part – IV** consists of **5 long answer type** questions carrying **5 marks** each, answer all the questions.

6. Use Blue or Black ink to write and underline and pencil to draw diagrams.

7. Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

PART - I

Answer all the questions   15 x 1 = 15

1. The principle based on which a solar cell operates is:

    (a) Photovoltaic action   (b) Diffusion

    (c) Carrier flow   (d) Recombination

2. If the amplitude of the magnetic field is 3×10^{-6} T, then the amplitude of the electric field for a electromagnetic wave is:

    (a) $600\,\text{Vm}^{-1}$ (b) $100\,\text{Vm}^{-1}$ (c) $900\,\text{Vm}^{-1}$ (d) $300\,\text{Vm}^{-1}$

3. A toaster operating at 240 V has resistance of 120 Ω. Its power is:

    (a) 240 W   (b) 400 W   (c) 480 W   (d) 2 W

4. Atomic number of H - like atom with ionization potential 122.4 V for n = 1 is:

    (a) 3   (b) 4   (c) 2   (d) 1

5. The transverse nature of light is shown in:

    (a) scattering   (b) interference   (c) polarization   (d) diffraction

6. 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 field is:

    (a) $\dfrac{Q}{\sqrt{2}}$ (b) $\dfrac{Q}{2}$ (c) Q (d) $\dfrac{Q}{\sqrt{3}}$

7. A bar magnet of length 'l' and magnetic moment 'P_m' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be:

    (a) $\dfrac{2}{\pi}P_m$ (b) P_m

    (c) $\dfrac{1}{2}P_m$ (d) $\dfrac{3}{\pi}P_m$
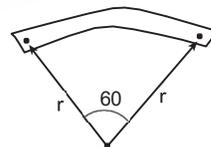
8. The speed of light in an isotropic medium depends on:

    (a) the nature of propagation   (b) its intensity

    (c) the motion of the source w.r.t. medium   (d) its wavelength

9. In a series RL circuit, the resistance and inductive reactance are the same, Then the phase difference between voltage and current in the circuit is:

    (a) $\dfrac{\pi}{6}$ (b) $\dfrac{\pi}{4}$ (c) zero   (d) $\dfrac{\pi}{2}$

10. Two identical conducting balls having positive charges q_1 and q_2 are separated by a center-to-center distance 'r'. If they are made to touch each other and then separated to the same distance, the force between them will be:

    (a) more than before   (b) less than before

    (c) zero   (d) same as before

11. Three capacitors are connected in triangle as shown in figure. The equivalent capacitance between the points A and C is:

    (a)   4 μF

    (b)   2 μF

    (c)   8 μF
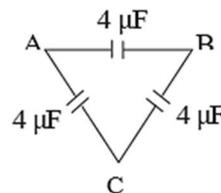
    (d)   6 μF

12. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV:

    (a)   6000 Å   (b)   4125 Å

    (c)   2062.5 Å   (d)   3750 Å

13. Light transmitted by Nicol prism is:

    (a)   plane polarised   (b)   partially polarised

    (c)   elliptically polarised   (d)   unpolarised

14. The gravitational waves were theoretically proposed by:

    (a)   Albert Einstein   (b)   Conrod Rontgen

    (c)   Edward Purcell   (d)   Marie Curie

15. The value of forbidden energy gap for Si at room temperature is:

    (a)   1.1 V   (b)   0.7 eV

    (c)   1.1 eV   (d)   0.7 V

PART-II

Answer any SIX of the following questions. Question No. 24 is compulsory   **6 x 2 = 12**

16. What is meant by hysteresis?

17. State Malu s' Law.

18. Define Electrostatic Potential.

19. A straight metal wire crosses a magnetic field of flux 4 mWb in a time 0.4 sec. Find the magnitude of the emf induced in the wire.

20. State the applications of Seebeck Effect.

21. The half-life of radioactive sample is 5.01 days. Calculate the decay constant.

22. What are electromagnetic waves?

23. What is meant by biasing? Mention its types.

24. If the focal length is 150 cm for a lens, what is the power of the lens?

Answer any SIX of the following questions. Question No. 33 is compulsory   **6 x 3 = 18**

25.   Discuss the Beta$^+$ (β^+) decay process with an example.

26.   A copper wire of cross-sectional area 0.5 mm^2 carries a current of 0.2 A. If the free electron density of copper wire is 8.4×10^{28} m^{-3}, then compute the drift velocity of free electron.

27.   Derive the equation for effective focal length for lenses in contact.

28.   Define current sensitivity. State the factors which increase the current sensitivity of a galvanometer.

29.   How many photons per second emanate from a 50 mW laser of 640 nm?

30.   Derive the equation for inductance of a solenoid. Assume that the length of the solenoid is greater than its diameter.

31.   What are the differences between interference and diffraction?

32.   Obtain Gauss law from Coulomb's law.

33.   Determine the wavelength of the light emitted from LED, which is made up of GaAsP semiconductor, whose forbidden energy gap is 1.875 eV. Mention the colour of the light emitted (Given $h = 6.6 \times 10^{-34}$ Js).

PART-IV

Answer all the questions.   **5 x 5 = 25**

34.   (a) Explain about simple microscope and obtain equation for magnification for near point focusing and normal focusing.

(OR)

(b) Explain the determination of unknown resistance using metre bridge.

35.   (a) Calculate the magnetic field produced at a point along the axis of the current carrying circular coil. Write down the equation of the magnetic field at the center of the coil using Biot-Savart law.

(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.

36.   (a) Obtain Einstein's photoelectric equation with necessary explanations.

(OR)

(b) Find out the phase relationship between the voltage and current in a pure inductive circuit. Draw the phasor and wave diagrams.

37.   (a) List out the advantages and limitations of frequency modulation.

(OR)

(b) Explain the Maxwell's modification of Ampere's circuital law.

38.   (a) Calculate the electric field due to a dipole at a point on the axial line

(OR)

(b)   What is nuclear reactor? Write note on Moderators, Control rods and Cooling system.