

MODEL QUESTION PAPER 2019-20**STANDARD XII****PHYSICS**

Time Allowed: 15 min + 2:30 Hr]

[Maximum Marks: 70

- Instructions:** (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
- (2) Use **Blue or Black** ink to write and underline use pencil to draw diagrams.

PART - I

- Note:** (i) Answer **all** the questions. 15x1 = 15
- (ii) Choose the most appropriate answer from the **four** given alternatives and write the option code with the corresponding answer.

- When the current changes from +2 A to -2 A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is:
 (a) 0.2 H (b) 0.4 H (c) 0.8 H (d) 0.1 H
- If λ_V , λ_X and λ_M represent the wavelengths of visible light, X-rays and microwaves respectively, then:
 (a) $\lambda_M > \lambda_X > \lambda_V$ (b) $\lambda_V > \lambda_M > \lambda_X$
 (c) $\lambda_M > \lambda_V > \lambda_X$ (d) $\lambda_V > \lambda_X > \lambda_M$
- The materials used in Robotics are:
 (a) aluminium and silver (b) silver and gold
 (c) copper and gold (d) steel and aluminium
- Two wires of A and B with circular cross-section are made up of the same material with equal lengths. If $R_A = 3 R_B$, then what is the ratio of radius of wire A to that of B?
 (a) 3 (b) $\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{3}$
- 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

6. A ray of light strikes a glass plate at an angle 60° . If the reflected and refracted rays are perpendicular to each other, the refractive index of the glass is:

- (a) $\sqrt{3}$ (b) $\frac{3}{2}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{3}$

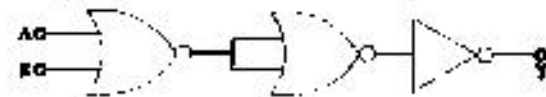
7. If voltage applied on a capacitor is increased from V to $2V$:

- (a) Q remains the same, C is doubled (b) Q is doubled, C doubled
(c) C remains same, Q doubled (d) Both Q and C remain same

8. The nucleus is approximately spherical in shape. Then the surface area of the nucleus having mass number A varies as:

- (a) $A^{\frac{2}{3}}$ (b) $A^{\frac{4}{3}}$ (c) $A^{\frac{1}{3}}$ (d) $A^{\frac{5}{3}}$

9. The given electrical network is equivalent to:



- (a) AND gate (b) OR gate (c) NOR gate (d) NOT gate

10. A wire of length l carries a current I along the Y direction and magnetic field is

given by $\vec{B} = \frac{\beta}{\sqrt{3}}(i - j + k)\hat{T}$. The magnitude of Lorentz force acting on the wire is:

- (a) $\sqrt{\frac{2}{3}}\beta Il$ (b) $\sqrt{\frac{1}{\sqrt{3}}}$ (c) βIl (d) $\beta Il \sqrt{2}$

11. When a point charge of $6 \mu\text{C}$ is moved between two points in an electric field, the work done is $1.8 \times 10^{-5} \text{ J}$. The potential difference between the two points is:

- (a) 1.08 V (b) $1.08 \mu\text{V}$ (c) 3 V (d) 30 V

12. The wavelength of an electron λ_e and that of a photon λ_p of same energy E are related by:

- (a) $\lambda_p \propto \lambda_e$ (b) $\lambda_p \propto \sqrt{\lambda_e}$
(c) $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$ (d) $\lambda_p \propto \lambda_e^2$

13. For a myopic eye, the defect is cured by using a:
(a) convex lens (b) concave lens
(c) cylindrical lens (d) plane glass
14. In a tangent galvanometer experiment, for two different values of current if the deflections are 45° and 30° respectively, then the ratio of the currents is:
(a) 2:3 (b) 3:2 (c) $\sqrt{3} : 1$ (d) $1 : \sqrt{3}$
15. If the current gain α of a transistor is 0.98, what is the value of β of the transistor?
(a) 0.49 (b) 49 (c) 4.9 (d) 5

PART-II

Answer any six questions. Question number 24 is compulsory. 6 × 2 = 12

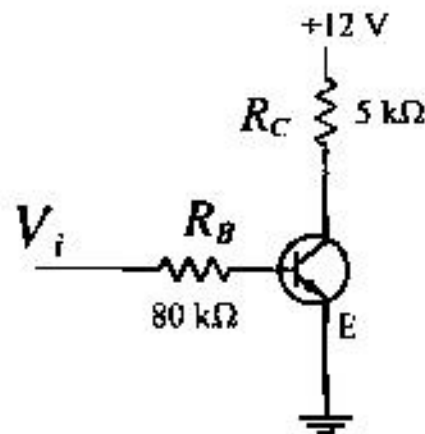
16. What is meant by Fraunhofer lines?
17. Why steel is preferred in making robots?
18. State Lenz's law.
19. Why do clouds appear white?
20. Calculate the radius of $^{197}_{79}\text{Au}$
21. What is the need for feedback circuit in transistor oscillator?
22. Show graphically the variation of electric field E (y-axis) due to a charged infinite plane sheet with distance r (x-axis) from the plate.
23. Give any two applications of internet
24. Calculate the magnetic field inside a solenoid when the number of turns is halved and the length of the solenoid and the area remain the same.

PART-III

Answer any six questions. Question number 33 is compulsory. 6 × 3 = 18

25. Two cells each of 5 V are connected in series across a 8Ω resistor and three parallel resistors of 4Ω , 6Ω and 12Ω . Draw the circuit diagram for the above arrangement and find the current through each resistor.
26. Explain the various energy losses in a transformer.

27. Discuss the alpha-decay process with example.
28. Obtain the expression for the energy stored in a parallel plate capacitor.
29. Explain any three recent advancements in medical technology.
30. Two light sources with amplitudes 5 units and 3 units respectively interfere with each other. Calculate the ratio of maximum and minimum intensities.
31. An electron moves in a circular orbit with a uniform speed v . It produces a magnetic field B at the centre of the circle. Prove that the radius of the circle is proportional to $\sqrt{\frac{v}{B}}$.
32. Give the construction and working of photo-emissive cell.
33. In the circuit shown in the figure, the input voltage $V_i = +5$ V, $V_{BE} = +0.8$ V and $V_{CE} = +0.12$ V. Find the values of I_B , I_C and β .



PART-IV

Answer all the questions.

5 × 5 = 25

34. (a) Obtain the expression for electric field due to a uniformly charged spherical shell at a distance r from its centre.

OR

- (b) Write any five properties of electromagnetic waves.

35. (a) What is modulation? Explain the types of modulation with necessary diagrams.

OR

(b) Find the expression for the mutual inductance between a pair of coils and show that $M_{12} = M_{21}$.

36. (a) Derive the expression for the radius of the orbit of the electron and its velocity using Bohr atom model.

OR

(c) Discuss the working and theory of cyclotron in detail.

37. (a) Obtain lens-makers' formula and mention its significance.

OR

(b) Explain the construction and working of a full-wave rectifier.

38. (a) i. Derive the expression for the de Broglie wavelength of an electron.

ii. An electron is accelerated through a potential difference of 81 V. What is the de Broglie wavelength associated with it? To which part of the electromagnetic spectrum does this wavelength correspond?

OR

(b) i. How will you measure the internal resistance of a cell by potentiometer?

ii. A cell supplies a current of 0.9 A through a 1Ω resistor and a current of 0.3 A through a 2Ω resistor. Calculate the internal resistance of the cell.