**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.

1. 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

2. If $\lambda_V$, $\lambda_X$ and $\lambda_M$ 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) $\lambda_V > \lambda_X > \lambda_M$

3. The materials used in Robotics are:
   (a) aluminium and silver (b) silver and gold
   (c) copper and gold (d) steel and aluminium

4. 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) $\frac{1}{3}$

5. 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 $60^0$. 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 $2V$:

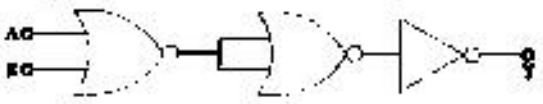
(a) $Q$ remains the same, $C$ is doubled (b) $Q$ is doubled, $C$ doubled

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

(a) $\sqrt{\frac{2}{3}}Il$ (b) $\sqrt{\frac{1}{\sqrt{3}}}$ (c) $\beta Il$ $\sqrt{2}$l) $\beta Il$. $\sqrt{\frac{1}{2}}$

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

(a) 1.08 V (b) 1.08μV (c) 3 V (d) 30 V

12. The wavelengthof an electron $\lambda_e$ and that of a photon $\lambda_p$ of same energy $E$ are related by:

(a) $\lambda_p$ $\lambda_e$ (b) $\propto$ $\lambda_p$ $\sqrt{\lambda_e}$

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

13. For a myopic eye, the defect is cured by using a:
(a) convex lens (b) concave lens
(d) 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 $\alpha$ of a transistor is 0.98, what is the value of $\beta$ 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 $^{197}_{79}Au$

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 8 Ω resistor and three parallel resistors of 4 Ω, 6 Ω and 12 Ω. 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.

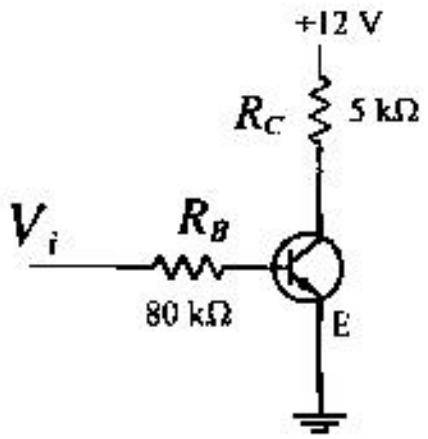
29. Explain any three recent advancements in medical technology.

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 $\beta$.




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

19/8/19
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