L-10
17-X

Total No. of Questions : 21]

Roll No ....

[Total No. of Printed Pages : 4

HSE2PKM-14
217-X

PHYSICS

Time : 3 Hours + 15 Minutes extra to read the question paper]

[Maximum Marks : 70

(Long Answer Type Questions)

1. Derive an expression for the capacitance of a parallel plate capacitor in presence of dielectric slab between its plates.

Or

Find an expression for the electric field at a point on the axial line of an electric dipole.

5

2. Derive an expression for the magnetic force on a current carrying conductor in a uniform magnetic field. Identify the pairs of perpendicular vectors in the expression.

Or

With the help of a diagram, give the principle, construction and working of cyclotron.

5

3. Define power in an a.c. circuit. Derive an expression for average power in an LCR-series circuit.

Or

Give the principle, construction and working of a transformer. Name any three losses in a transformer.

5

4. Define Fringe Width. Derive an expression for the fringe width in case of Young's double slit experiment of interference of light.

Or

What is lens maker's formula ? Derive lens maker's formula for a convex lens.   5

(Short Answer Type Questions)

5. Derive an expression for electrostatic potential energy of a system of two point charges.   3

6. State Ohm's law. How can you derive it using the concept of drift velocity ?   3

7. How many electrons pass through a wire in 1·6 minutes, if the current through the wire is 300 mA ? https://www.jkboseonline.com   3

8. What are eddy currents ? How are they reduced ?   3

9. Derive Newton's relation in case of convex lens.   3

10. The angle of minimum deviation produced by a prism of angle 60° is 30°. If the velocity of light in vacuum is 3×10^8 m/s, calculate the velocity of light in glass of refractive index $\dfrac{3}{2}$.   3

11. Derive Radioactive Decay Law in Mathematical form.   3

12. What is a Zener Diode ? How is Zener Diode used as a voltage regulator ?   3

(Very Short Answer Type Questions)

13. Name and define elements of earth's magnetic field.   2

14. Give *four* characteristics of electromagnetic waves.   2

15. If amplitude of two waves from two coherent sources producing interference pattern is 1 : 4, find the ratio of intensity of maxima and minima.   2

16. Derive Einstein's photoelectric equation.   2

17. Calculate the de Broglie wavelength of a proton of mass 1.67×10^{-27} kg moving with a speed of 10^5 m/s. Take $h = 6.62 \times 10^{-34}$ Js.   2

18. Give *two* properties of α-rays.   2

19. Give the truth table and logic symbol of NAND gate.   2

20. Why sky waves are not used for T.V. signals ?   2

(Objective Type Questions)

21. Do as directed :

   (i) The heater element of electric iron is made of :

   (a) Nichrome   (b) Iron

   (c) Constantan   (d) Tungsten   1

   (ii) The resistance of ideal voltmeter is :

   (a) Zero   (b) Very low

   (c) Very large   (d) Infinite   1

   (iii) Name the electromagnetic wave that is absorbed by ozone layer in the atmosphere.   1

   (iv) An air bubble in water behaves as :

   (a) Convex lens   (b) Concave lens

   (c) Plane mirror   (d) None of these   1

   (v) The average binding energy per nucleon is of the order of.......MeV.   1

   (vi) A *p*-type semiconductor is :

   (a) Positively charged   (b) Neutral

   (c) Negatively charged   (d) None of these   1

(vii) An oscillator is nothing but an amplifier with a :

    (a)   Positive feedback   (b)   Negative feedback

    (c)   Zero feedback   (d)   None of these

                                                                        1

(viii) Name the layer of atmosphere from which radiowaves are reflected back.

                                                                        1

(ix) What are *three* elements of basic communication system ?

                                                                        1

(x) Give *one* example of amplitude modulation.

                                                                        1