	Bharatiya Vidya **Bhavan's** Vallabhram Mehta Public School (Vidyashram) Vadodara	54 YEARS Let noble thoughts come to us from every side-Rigveda, 1-89-i
Date:	**SAMPLE PAPER-2**	**Subject:PHYSICS**
Class: XII	**Name of the student:**	**Max. Marks:70**

General Instructions:
- All questions are compulsory.
- Questions 1 to 5 are one mark questions.
- Questions 6 to 10 are two marks questions.
- Questions 11 to 22 are three marks questions.
- Question 23 is value based question carrying four marks.
- Question 24 to 26 are five marks questions.
- There is no overall choice in the question paper. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the choices in such questions.
-Use of calculator is not permitted. However you may use log tables if necessary.
-You may use the following values of physical constants wherever necessary:

$c = 3x10^{-8}$m/s
$h = 6.63x10^{-34}$Js
$e = 1.6x10^{-19}$C
$\mu_0 = 4\pi x10^{-7}$ Tm/A
$1/4\pi\varepsilon_0 = 9x10^9$ Nm^2/C^2
$m_e = 9.1x10^{-31}$kg
$m_p = 1.675x10^{-27}$kg
$m_n = 1.673x10^{-27}$kg

1.What is the use of a transducer?

2.What are inductive components of an EM wave?

3.Define transconductance and mention its unit.

4.Draw the block diagram of basic elements of communication system.

5.Give construction of NOT gate from NOR gate.

6.Explain the effect of increase of intensity and potential difference on photoelectrons K.E.?

7.Explain why when current is flowing in a circular path, the magnetic field is straight.

<div align="center">Or</div>

An electron is describing a circle in a magnetic field of 10^{-4} tesla. Calculate the frequency of revolutions. Given mass of electron = 9 x 10^{-31} kg and charge on electron = 1.6 x 10^{-19}

8..Calculate the number of photons emitted per second by transmitter of 10 KW power, radio wave frequency of 6 x 10^5Hz.

9.Draw a sketch of a plane electromagnetic wave propagating along x axis. Depict clearly the direction of electric and magnetic field varying sinusoidally.

10.Calculate current drawn by the primary of a transformer which steps down 200V to 20V to operate a device of resistance 20Ω. Assume the efficiency of transformer to be 80%.

11.Explain TIR with suitable diagrams. Give atleast two examples for the same.

12.A double convex lens made of glass if refractive index 1.5 has its both surface of equal radii of curvature of 20cm each. An object of 5cm height is placed at a distance of 10cm from the lens. Find the position nature and size of image.

13.A magnetized steel wire 31.4 cm long has pole strength of 0.2 Am. It is then bent in the form of a semicircle. Calculate magnetic moment of the needle.

<div align="center">Or</div>

Two magnetic poles, one of which is four times stronger than the other exert a force of 10 gf on each other when placed at a distance of 10 cm in air. Find the strength of each pole.

14.A cyclotron's oscillator frequency is 10 MHz What should be the operating magnetic field for accelerating protons? If the radius of its disc is 0.60 m, what is the kinetic energy of the proton beam produced by the accelerator? (e=1.6 x10^{-19} C, m =1.67 x 10^{-27} kg). Express your answer in units of MeV.(1 MeV =1.602 x 10^{-13}J)

15.What is meant by sensitivity of a potentiometer? A battery E1 of 4V and variable resistance R are connected in series with wire AB. Length of wire is 1m. When cell of emf E2 = 1.5V is connected b/w A & C, no current flows through E2. Length of AC is 60cm.

(i)   Find the potentiometer difference b/w A & B.
(ii)   Would the method work if the battery E1 is replaced by a cell of emf of 1V.

16.Derive an expression for the impedance of an a.c. circuit with series L.C.R. combination.

17.Calculate the de Broglie wavelength for electrons and protons if their speed is 10^5 m s^{-1}?

18.Give reason for the following – Lighter elements are better moderators for a nuclear reactor than heavier elements? Explain role of moderators and give two examples.

19.Why do we require modulation? Explain the AM with block diagram.

20.What is understood by the term resistance of a conductor? Define its SI unit. Show that the resistance of a conductor is given by R=ml/ne2ΤA, where symbols have their usual meaning.

21.(i)Two slits 1mm apart are illuminated with a light of wavelength 500 nm. What would be the width of each slit to obtain 10 maxima of double slit pattern within the central maxima of the single slit pattern?

(ii)The velocity of a certain monochromatic light in a given transparent medium is 2.25 x 10^{8}m/s. What is the critical angle of incidence and the polarizing angle for this medium?

22.Draw diagrams to show the behaviour of magnetic field lines near a 'bar' of (i) copper

(ii) Aluminium and (iii) mercury cooled to a very low temperature.

23. Sunita was a childless widow. She ran her life only by the pension for the senior citizen from Government. When she switches of one bulb in her house all the other appliances get switched off. She could not even spend for an electrician.
Sapna living nearby decided to do something about this. She referred to physics books and learnt that the series combination for the household connection should be the reason. She called an electrician and had the circuit changed to parallel combination. The problem was solved and Sunita was happy. She thanked Sapna for her help to solve the problem.

   (i) What are the values possessed by Sapna?

   (ii) Why for household a parallel combination used? Give two advantages.

24.Coulomb's law for electrostatic force between two point charges and Newton's law for gravitational force between two stationary point masses, both have inverse-square dependence on the distance between the charges/masses.

    i)   Compare the strength of these forces by determining the ratio of their magnitudes (a) for an electron and a proton and (b) for two protons.

    ii)   Estimate the accelerations of electron and proton due to the electrical force of their mutual attraction when they are 1 Å (= 10^{-10} m) apart? (M_P = 1.67 × 10^{-27} kg, M_E = 9.11 × 10^{-31} kg)

<div align="center">Or</div>

A straight thick long wire of uniform cross section of radius 'a' is carrying a steady current I.

    a)   Use Ampere's circuital law to obtain a relation showing the variation of the magnetic field (B_r) inside and outside the wire with distance r,

        ($r \le a$) and ($r > a$) of the field point from the centre of its cross section.

    b)   Plot a graph showing the nature of this variation.

    c)   Calculate the ratio of magnetic field at a point a/2 above the surface of the wire to that at a point a/2 below its surface.

    d)   What is the maximum value of the field of this wire?

25. Draw a graph to show the variation of angle of deviation D with that of the angle of incidence i for a monochromatic ray of light passing through a glass prism of refracting angle A. hence

Derive the relation n = [sin(A+δm)/2] / sin(A/2)

Or

With the help of diagram explain the basic principle of working a.c. generator. In an a.c. generator coil of N turns and area A is rotated at rotation per second in a uniform magnetic field B. Write the expression of the emf produced.

26. Explain conversion of galvanometer to voltmeter and galvanometer to ammeter

Or

With help of examples and suitable diagrams, explain the difference between para, dia and ferro magnetic materials.

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