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-10**	**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

$m_e = 9.1x10\text{-}^{31}kg$

$m_p = 1.675x10^{-27}kg$

$m_n = 1.673x10^{-27}kg$

1.Suppose that you are in a cave deep within the earth. Are you safe from electrical storms?

2.Of the metals and alloys, which have greater value of temperature coefficient of resistivity?

3.How does the dip angle vary from equator to pole?

4.Write two applications of eddy currents.

5.What is the SI unit for the activity of a radioactive substance?

6.A sphere of radius 0.03 m has a point charge q = 7.6 □C located at its centre. Find the electric flux through it.

7.Two substances A and B have relative permeabilities slightly greater and less than unity respectively.What do you conclude about A and B?

OR

The horizontal and vertical components of Earth's magnetic field at a place are 0.22G and 0.38Grespectively. Calculate the angle of dip and resultant intensity of Earth's magnetic field.

8.Watching the sunset on a beach, one can see the Sun several minutes after it has actually set. Explain, why?

9.How does the stopping potential in a photoelectric emission depends on the (i) intensity of the incident radiation in a photocell and (ii) the frequency of the incident radiation?

10.What do you mean by modulation and demodulation?

11.What are the limitations of Coulomb's law in electrostatics? Is it valid in all the situations?

OR

Three charges +q, +q and -2q are placed at the vertices of an equilateral triangle. What is the dipole moment of the system?

12.Derive the expression for the equivalent emf and internal resistance for the parallel combination of two cells with emf's E1 and E2 and internal resistances r1 and r2 respectively. What is the corresponding formula for the series combination?

13.Derive the expression for the force between two parallel current carrying conductors and hence define one ampere.

14.Define mutual inductance. Derive an expression for mutual inductance of two long coaxial solenoids of same lengths wound over each other.

15.Write the order of frequency range and one use of each of the following electromagnetic radiations: (i) microwaves, (ii) ultraviolet rays and (iii) gamma rays.

16.State the conditions of total internal reflection of light to take place at an interface separating two transparent media. Hence derive an expression for the critical angle in terms of the speed of light in the two media. The velocity of light in a liquid is 1.5 × 108 m/s and in air it is 3 × 108 m/s. If a ray of light passes from this liquid into air, calculate the value of critical angle.

17.State Huygen's principle and deduce the laws of reflection on the basis of this principle.

18.Light of wavelength 2000 A falls on aluminium surface. In aluminium 4.2 eV are required to remove an electron. What is the kinetic energy of: (i) the fastest, (ii) the slowest emitted photo electrons and (iii) what is the stopping potential?

19.Explain how Rutherford's experiment on scattering of alpha particles led to the estimation of the size of nucleus. What are the conclusions made by Rutherford by this experiment?

20.What is a p-n junction diode? How is the potential barrier set up in a p-n junction?

21.Distinguish between the amplitude modulation and frequency modulation. Why is the FM signal less susceptible to noise than an AM signal?

22.In a single slit diffraction, how does the angular width of the central maximum change when : (i)slit width is decreased, (ii) distance between the slit and screen is increased and (iii) the light of smaller visible wavelength is used?

23.Alok was playing cricket with his friends, when a ball hit his friend Palash on his left leg. Palash screamed with pain. Alok rushed towards him and comforted him and asked him not to move his leg. He quickly took out his cell phone and called up Palash's parents and briefed them about the incident. In 20 minutes Palash was taken them to the nearby hospital and was examined by the doctor who advised for an X rays test which confirmed a hairline fracture.

(i)How are X rays produced?
(ii)Mention one other application of X rays.
(iii)Mention two qualities of Alok which reflected from the above situations.

24.(a) Write the principle and working of ac generator.
(b)An ac generator consists of a coil of 50 turns and area 2.5 m2 rotating at an angular speed of 60 rad/s in uniform magnetic field B = 0.30 T between two fixed pole pieces. The resistance of the circuit including the coil is 500 Ω.
(i)What is the maximum current drawn by the generator?
(ii)What is the flux through the coil when the current is zero and when the current is maximum?
(iii)Would the generator work if the coil were stationary and instead the pole pieces rotated together with the same speed as above?

OR

Derive an expression for the frequency of LC oscillations when a capacitor discharges itself through an inductor. Show that the energy is conserved during LC oscillations.

25.(a) Discuss Young's double slit experiment to demonstrate the interference of light. What are the conditions of bright and dark fringes?
(b)Two sources of intensities I1 and I2 undergo interfere in Young's double slit experiment. Find the ratio of maximum intensity to the minimum intensity of light after interference.

OR

(a)Show that with the monochromatic light, the interference patterns shown by thin film when viewed by reflected and transmitted light are complementary.

(b)Two polaroids are placed at 90□ to each other and the transmitted intensity is zero. What happens when one more polaroid is placed between these two bisecting the angle between them?

26.Explain the principle of a device that can build up high voltages of the order of few million volts. Draw a schematic diagram and explain the working of this device. Is there any restriction on the upper limit of the high voltages set up in this machine? Explain.

OR

(a)Define capacitance. Derive an expression for the capacitance of a parallel plate capacitor.
(b)Find the capacitance of three parallel plates, each of area A m2 and are separated by a distance d1 and d2 m. The in between space is filled with dielectrics of relative permittivities ε_1 and ε_2. The permittivity of free space isε_0.

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