Date:	SAMPLE-3		Subject:PHYSICS
Class:XII	Name of the student:		Max. Marks:70

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

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:
   $c = 3 \times 10^{-8}$ m/s
   $h = 6.63 \times 10^{-34}$ Js
   $e = 1.6 \times 10^{-19}$ C
   $\mu_0 = 4\pi \times 10^{-7}$ Tm/A
   $1/4\pi\varepsilon_0 = 9 \times 10^9$ Nm^2/C^2
   $m_e = 9.1 \times 10^{-31}$ kg
   $m_p = 1.675 \times 10^{-27}$ kg
   $m_n = 1.673 \times 10^{-27}$ kg

1. Draw the circuit symbol for pnp transistor.

2. Two electric bulbs whose resistances are in the ratio 1:2 are connected in parallel to a source of constant voltage. What will be the ratio of power dissipation in these wires?

3. Why is the energy gap also called as forbidden gap?

4. Two beams, one of red light and the other of blue light, of same intensity, are incident on a metallic surface to emit photoelectrons. Which of the two beams emits electrons of greater kinetic energy?

5. How can paramagnetic and diamagnetic material rods be distinguished in a magnetic field?

6. Define i) modulation   ii) bandwidth

7.Draw a labeled diagram of Astronomical telescope in normal adjustment.
                                     OR
Draw a labeled diagram of Compound microscope for final image formed at near point.

8.Discuss how AND gate is realized from the NAND gate.
9. Two identical plane metallic surfaces A and B are kept parallel to each other in air, separated by distance of 1cm. Surface A is given a positive potential of 10Vand the outer surface of B is earthed.
a)What is the magnitude and direction of the uniform electric field between the points Y and Z ?

b)What is the work done in moving a charge of 20μC from point X to point Y?
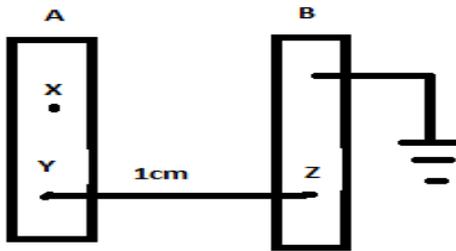
10. State Huygen's principle and use it to prove the Snell's law of refraction for a wavefront.

11. i)Define power of a lens with its SI unit.
 ii)You are given three lenses L1,L2 and L3 each of focal length 20cm. An object is kept at 40cm in front of L1. The final real image is formed at the focus of L3. Find separations between L1,L2 and L3.

 12. Find expressions for equivalent emf and equivalent internal resistance for parallel combination of cells.

13. Name the constituent radiation of electromagnetic spectrum which
i)is used for identifying elements in chemistry by flame test ii)is used for detection of forgery of documents iii)used in magnetic resonance imaging iv)produces intense heating effect v)used to see in foggy condition vi)for food preservation.

14. Show that current lags voltage by $\pi/2$ for ac current applied across an inductor. Also show that the average power loss is zero.
<div align="center">OR</div>
What is resonance of LCR circuit? Explain power factor and when can power factor of a circuit be maximum? Prove that the average power loss in a choke coil is zero.

15.Explain LOS mode of communication and mention the range of frequencies that can be transmitted using this mode.

16.Define interference of light and mention the condition essential for interference to take place. Derive the condition for formation of maxima and minima of an interference pattern.

17.Explain how wave nature of material particles was verified through Davisson-Germer's experiment.

18.What are stationary orbits according to Bohr's postulates? The energy of the hydrogen atom in its ground state is – 13.6eV. Determine the total energy, kinetic energy, potential energy and binding energy of an electron of the energy level whose quantum number is 4.

19. Discuss the working of a full wave rectifier.
20. A solenoid 50cm long has 2 layers of windings of 350 turns each. The radius of the lowest layer is 2cm. If the current carried is 6A, estimate the magnitude of magnetic flux density i)near the centre of the solenoid on its axis ii)near the ends on its axis iii)outside the solenoid near the centre.

21. Calculate the Binding energy per nucleon for $_{20}Ca^{40}$.
   $m(_{20}Ca^{40})$=39.962589u, $m(n)$=1.0086654u, $m(p)$=1.007825u, 1u=931MeV/c^2

22. What is the principle of a potentiometer? How can internal resistance of a cell be determined using it?

23.On the festival of uttarayan, suresh was flying kites in the afternoon. His mother saw him and told him
wear sunglasses to protect his eyes as staring at the sun for a long period was harmful and could damage eyesight.
i)What are the values shown by suresh's mother?
ii)Why she advised him to wear sunglasses?
iii)Which phenomenon is responsible for reduction in intensity of light on wearing glasses. What information does one obtain from polarization about the nature of light?

24. (a) Show mathematically that the electric field intensity due to a short dipole at a distance d along its axis is twice the intensity at the same distance along the equatorial axis.
(b) Two equal charges of -10^{-16}C each are kept 10cm apart in air. Calculate i)electric field at a point midway between them ii)force acting on charge of -10^{-16}C kept at point midway between them.
                                    OR
(a) Deduce an expression for the capacitance of a parallel plate capacitor when a dielectric is inserted between the plates. Assume that the slab thickness to be less than the plate separation.
(b) A 500pF capacitor is charged by a 100V supply. It is then disconnected from the supply and is connected to another uncharged 600pF capacitor. How much electrostatic energy is lost in the process?

25.(a)Draw a labeled circuit arrangement showing the windings of primary and secondary coil in a transformer. Explain the underlying principle and working of a step-up transformer . Also explain hysteresis loss, flux loss and ways to overcome them.
(b)A step-up transformer is used on a 120V line to provide a potential difference of 2400V. If the primary has 75 turns, how many turns must the secondary have?
                                    OR
Explain the phenomenon of mutual induction. Define the coefficient of mutual inductance and state is SI unit. Also derive an expression for coefficient of mutual inductance between two long solenoids. Also derive an expression for magnetic energy stored in an inductor.

26. (a) Derive an expression for the force between two long parallel current carrying conductors.
(b)Use this expression to define the SI unit of current.
(c) A long straight conductor PQ carrying a current 60A if fixed horizontally. Another long conductor XY is kept parallel to PQ at a distance of 4mm in air. Conductor XY if free to move and carries a current I, Calculate the magnitude and direction of I for which the magnetic repulsion just balances the weight of the conductor XY(mass per unit length of the conductor XY is 10^{-2}kg/m)
                                    OR
(a) Distinguish the magnetic properties of a dia, para and ferromagnetic substances in terms of i)susceptibility ii)magnetic permeability and iii)coercivity. Give one example of each of these materials.
(b)Draw the field lines due to an external magnetic field near a i)ferromagnetic ii)paramagnetic substance.
(c) Define : Magnetic Permeability and Susceptibility

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