

Sample Paper – 2011
Class – XII
Subject -Physics

Time: 3 hours

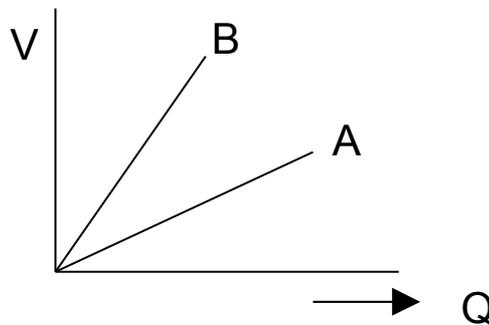
Max. Marks: 70

General Instructions:

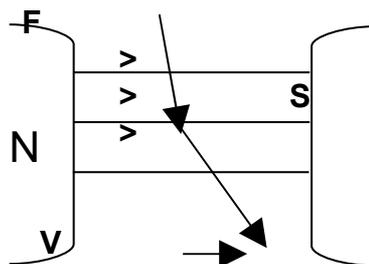
1. *All questions are compulsory.*
2. *Internal choices have been provided in some questions. You have to attempt only one of the choices in such questions.*
3. *Questions 1 to 8 are very short answer type question carrying 1 mark each.*
4. *Questions 9 to 18 are short answer type question carrying 2 marks each.*
5. *Questions 19 to 27 are also short answer type question carrying 3 marks each.*
6. *Questions 28 to 30 are very long answer type question carrying 5 marks each.*
7. *Use log tables, if necessary.*

Q.1 Arrange the given electromagnetic radiation in descending order of their frequencies: Infrared Rays, UV rays and gamma rays.

Q.2 The graph shows the variation of voltage 'V' across the plates of two capacitors A and B versus charged on them. This of the capacitors has higher capacitance?



Q.3 A charged particle moving with velocity 'v' as shown in figure experiences an upward force. What force. What is the charge sign on the particle?



Q.4 Light of wavelength 6000\AA in air enters a medium of $\mu=1.5$. What will be its frequency in the medium ?

Q.5 Name the physical quantity whose S.I. unit is J/C. Is it scalar or a vector quantity?

Q.6 The ground state energy of H-atom is -13.6 eV . What are the kinetic and potential energies of electron in this state?

Q.7 Force is given by $\mathbf{F} = q(\mathbf{V} \times \mathbf{B})$ of these name the pairs of vector which are always at right angles to each other.

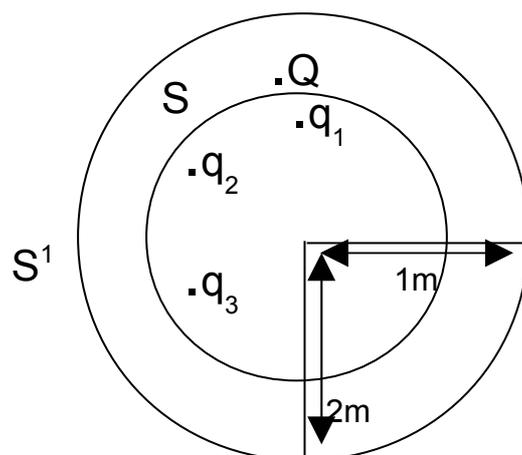
Q.8 Two thin lenses of power $+6\text{D}$ and -2D are in contact. What is the focal length of the combination?

Q.9 Obtain the binding energy of the nuclei ${}_{26}\text{Fe}^{56}$ in units of eV from the following data: $m_e = 55.934939\text{u}$, $m_n = 1.008665\text{u}$ and $m_p = 1.007825\text{u}$.

Q.10 Distinguish between point to point and broadcast communication mode. Give one example of each.

Q.11 If the current sensitivity of a moving coil – galvanometer is increased by 20%, its resistance also increase by 1.5 times, How will the voltage sensitivity of the galvanometer be affected ?

Q.12 The flux of the electrostatic field through the closed spherical surface 's' is found to be 4 times that through the closed spherical surface S. Find the magnitude of the charge Q. Given $q_1 = 1\text{ uc}$, $q_2 = -\text{uc}$, $q_3 = 9.854\text{ uc}$.



Q.13 What does the term LOS communication mean? Name the types of waves that are used for this communication. Which of the two height of

Q.19 Distinguish between frequency modulation and amplitude modulation. Why is an FM signal less susceptible to noise than an AM signal?

Q.20 What is an intrinsic type of semiconductor? How can this material be converted into (i) P – type (ii)N-type extrinsic semi conductor. Explain with the help of energy band diagram.

Q.21 Define the term decay constant of a radio active nucleus. Two nuclei P, Q have equal no. of atoms at $t = 0$. Their half lives are 3 hours and 9 hours respectively. Compare their rates of disintegration, after 18 hours from the start.

Q.22 Deduce an expression for the self – inductance of a long solenoid of ‘N’ turns, having a core of relative permeability μ_r .

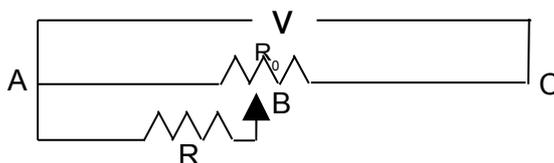
Q.23 A double convex lens of glass of refractive index 1.6 has its both surfaces of equal radii of curvature of 30 cm each. An object of height 5 cm is placed at a distance of 12.5 cm from the lens. Calculate the size of the image formed.

Q.24 Mention the significance of Davison – Germer experiment and α – particle and a proton are accelerated from rest through the same p.d ‘V’. Find the ratio of de – broglie wave length associated with them.

Q.25 What is the effect on the interference fringes in a young’s double slit experiment due to each of the following operations:

- The screen is moved away from the plane of the slits;
- the (monochromatic) source is replaced by another (monochromatic) source of shorter wavelength;
- The separation between the two slits is increased

Q.26 A resistance of R ohm draws current from a potentiometer. The potentiometer has a total resistance R_0 ohm as shown in figure.



A voltage ‘V’ is supplied to the potentiometer. Derive an expression for the voltage across ‘R’ when the sliding contact is in the middle of the potentiometer.

Q.27 Derive an expression for the energy stored in a parallel plate capacitor ‘C’ with air as the medium between its plates and having charges ‘Q’.

show that energy can be expressed in terms of the electric field as where 'A' is the area of the plate and 'd' is the separation between the plates.
'OR'

Define the term dipole moment of an electric field indicating its direction. Write its S. I. unit.

An electric dipole is placed in a uniform electric field, deduce an expression for the torque acting on it. In a particular situation, it has its dipole moment aligned with the electric field. Is the equilibrium stable or unstable?

Q.28 (a) Draw a ray diagram to show the refraction of light through a glass prism. Hence obtain the relation for the angle of deviation in terms of the angle of incidence, Angle of emergence and the angle of the prism.

(b) A right angled isosceles glass prism is made from glass of refractive index 1.5. Show that a ray of light incident normally on :

- (i) One of the equal sides of this prism is deviated through 90° .
- (ii) The hypotenuse of this prism is deviated through 180° .

OR

Q.(a) With the help of a labeled ray diagram, show the image formation by a compound microscope. Derive an expression for its magnifying power.

(b) How does the resolving power of a compound microscope get reflected on:

- (i) Decreasing the diameter of its objective?
- (ii) Increasing the focal length of its objective.

Q.29 Define the term wavefront. Draw the wavefront and corresponding rays in the case of a

- (i) Diverging spherical wave .
- (ii) Plane wave.

Using Huygen's construction of a wavefront, explain the refraction of a plane wavefront at a plane surface and hence verify Snell's law.

OR

Q. Derive the relation between the focal length of a convex lens in terms of the radii of curvature of the two surfaces and refractive index of its material. Write the sign conventions and two assumptions use in the derivation of this relation.

Q.30(a) Draw the circuit diagrams of a p-n junction diode in (i) forward bias (ii) reverse bias. How are these circuit used to study the V-I characteristics of a silicon diode? Draw the typical V-I characteristics.

(b) What is a light emitting diode(LED)? Mention Two important advantages of LEDs over conventional lamps.

OR

Q.(a) Draw the circuit arrangement for studying the input and output characteristics of an n-p-n transistor in CE configuration. With the help of these characteristics define (i) Input resistance (ii) Current – amplification factor.

(b) Describe briefly with the help of a circuit diagram how an n-p-n transistor is used to produce self – sustained oscillations.