

**AISSCE – 2016**

**CLASS: XII**

**Subject: Physics**

**EXPECTED (SURE SHORT) QUESTIONS WEIGHTAGE-WISE 2016**

**Section A ( 1 Mark )**

- Q1 A force 'F' is acting between two charges placed some distances apart in vacuum. If a brass rod is placed between these two charges, how does the force change?
- Q2 A certain potential difference 'V' is applied across a conductor. If another conductor is connected in parallel with it, what happens to the drift velocity?
- Q3 An electron and a proton, having equal momentum, enter a uniform magnetic field at right angles to the field lines. What will be the ratio of curvature of their trajectories?
- Q4 The electric current flowing in a wire in the direction B to A is decreasing. What is the direction of induced current in the metallic loop kept above the wire as shown in Figure 1?

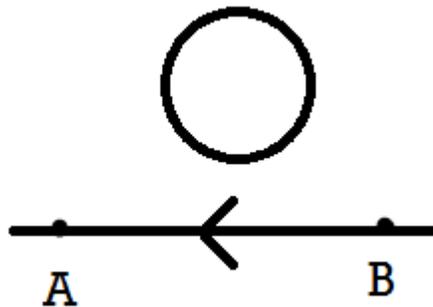


Figure 1

- Q5 Arrange the following in the descending order of wavelengths: Gamma Rays, Infrared Rays, Microwaves, and Radio Waves.
- Q6 How is the focal length of a spherical mirror affected, when the wavelength of the light used is increased?
- Q7 A graph is plotted between the maximum Kinetic Energy of emitted photo-electrons and the frequency of incident radiations. Which physical constant can be determined from slope of this graph?
- Q8 What is the ratio of the nuclear densities of two nuclei having mass numbers in the ratio 1:4?
- Q9 Why is the conductivity of n-type semiconductor greater than that of the p-type semiconductor even when both of these have same level of doping?
- Q10 Why T.V Signals are not transmitted using sky waves?

**Section B ( 2 Marks )**

- Q1 Define electric line of force? Write two importance of electric line of force?
- Q2 A sphere  $S_1$  of radius  $r_1$  encloses a charge  $Q$ . If there is another concentric sphere of radius  $r_2$  ( $r_2 > r_1$ ) and there be no additional charges between  $S_1$  and  $S_2$ , find the ratio of the electric flux through  $S_1$  and  $S_2$ .

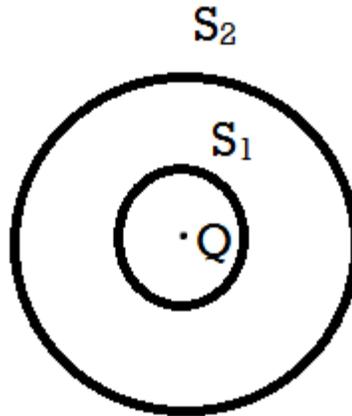


Figure 2

- Q3 The V-I graphs of two resistors, and their series combination, are shown in Figure 3. Which one of these graphs represents the series combination of the other two? Give reasons for your answer.

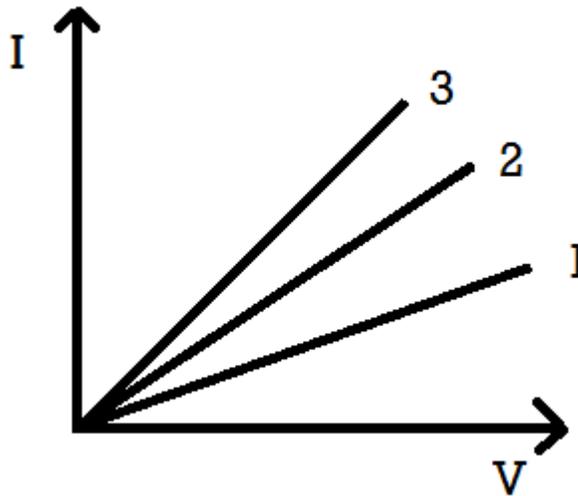


Figure 3

- Q4 The following circuit shows the use of potentiometer to measure the internal resistance of a cell:

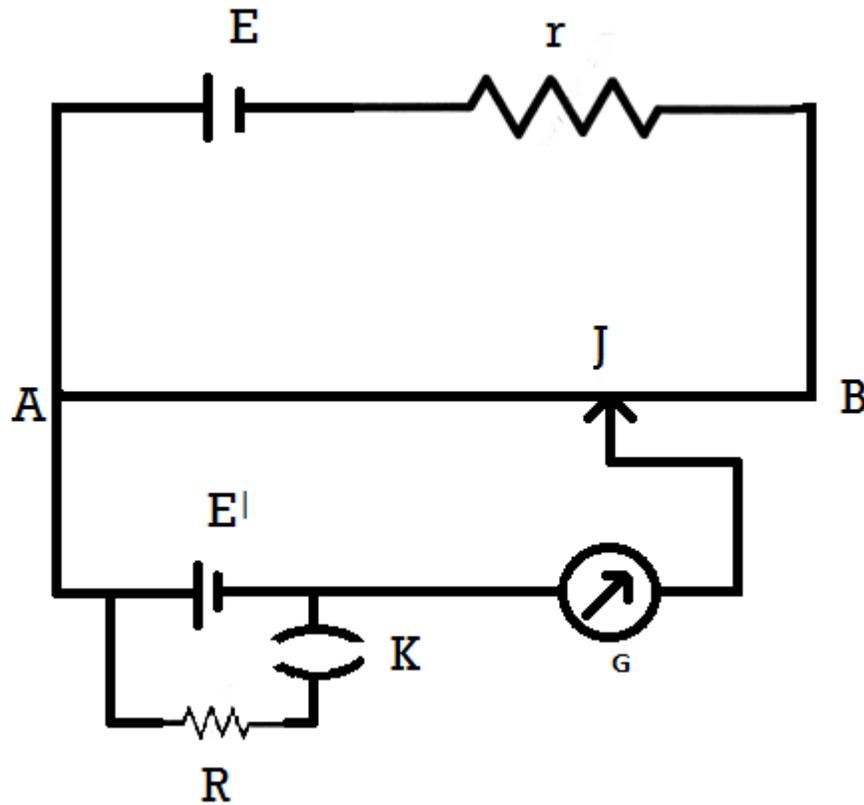


Figure 4

- (i). When the key  $K$  is open, how does the balance point change, if the current from the driver cell decreases?
- (ii). When the key  $K$  is closed, how does the balance point change if  $R$  is increased, keeping the current from the driver cell constant?
- Q5 Establish a relation between drift velocity of an electron in a conductor of cross section 'A', carrying current 'I' and concentration 'n' of free electrons per unit volume of conductor.
- Q6 Distinguish between diamagnetic and ferromagnetic substances in respect of
- Behaviour in a non-uniform magnetic field and
  - Susceptibility

Q7 The following figure shows an inductor L and a resistor R connected in parallel to a battery through a switch. The resistance of R is the same as that of the coil that makes L. Two identical bulbs are put in each arm of the circuit.

- (i). Which of the bulbs lights up bright when S is closed?
- (ii). Will the two bulbs be equally bright after some time?

Give reasons for your answer.

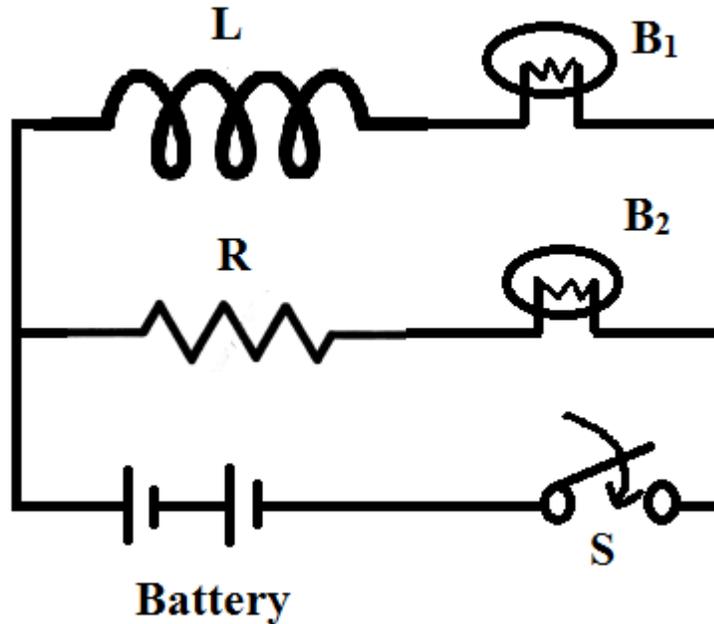
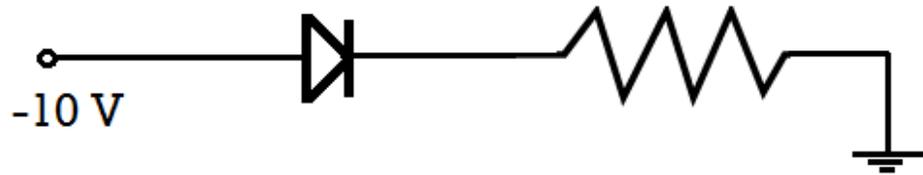


Figure 5

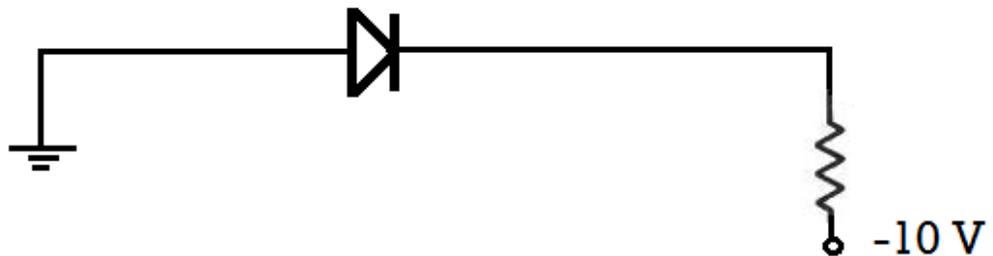
- Q8 Identify the part of the electromagnetic spectrum which is
- (a). Suitable for radar system used in aircraft navigation
  - (b). Adjacent to the low frequency end of the electromagnetic spectrum.
  - (c). Produced in nuclear radiation
  - (d). Produced by bombarding a metal target by high speed electrons.
- Q9 What changes in the focal length of a
- (1). Concave Mirror
  - (2). Convex Lens
- occur when the incident violet light on them is replaced with red light?
- Q10 Show that the de Broglie wavelength ' $\lambda$ ' of electrons accelerated through a potential difference of V volts can be expressed as
- $$\lambda = \frac{12.3}{\sqrt{V}} \text{ \AA}$$
- Q11 Prove that the radius of the  $n^{\text{th}}$  Bohr orbit of an atom is directly proportional to  $n^2$ , where n is principal quantum number.
- Q12 How does the size of a nucleus depend on its mass number? Hence explain why the density of nuclear matter should be independent of size of the nucleus.

- Q13 How the thickness of depletion layer in a p-n junction diode changes when it is  
(i). Forward biased  
(ii). Reversed biased.

In the following circuit which one of the two diodes is forward biased and which is reversed biased?



( a )



( b )

Figure 6

- Q14 Define the term modulation. Explain the need of modulating a low frequency information signal.
- Q15 Define the term LOS. Write the limitation of LOS. Write two techniques used for increasing the range of signal coverage in the LOS.

**Section C ( 3 Marks )**

- Q1 Define electric dipole moment. Derive an expression for the electric field intensity at any point along the equatorial line of an electric dipole.
- Q2 State Gauss's theorem in electro statics. Apply this theorem to calculate the electric field due to a uniformly charged spherical shell at a point  
(i). Outside the shell  
(ii). On the shell  
(iii). And inside the shell

- Q3 A parallel plate capacitor, each with plate area  $A$  and separation  $d$ , is charge to a potential difference  $V$ . The battery used to charge it then disconnected. A dielectric slab of thickness ' $t$ ' and dielectric constant ' $K$ ' is now placed between the plates. What change, if any, will take place in:
- Charge on the plate
  - Electric field intensity between the plates
  - Capacitance of the capacitor
- Justify your answer in each case.
- Q4 State the principle of a potentiometer with the help of a circuit diagram, describe a method to find the internal resistance of a primary cell.
- Q5 Three identical resistors, each of resistance  $R$ , when connected in series with a D.C. source, dissipate power ' $X$ '. If the resistors are connected in parallel to the same D.C source, how much power will be dissipated?
- Q6 Derive an expression for the force per unit length experienced by each of the two long current carrying conductors placed parallel to each other in air. Hence define one ampere of Current.
- Q7 Using Biot-Savart law, derive the expression for the magnetic field due to a current carrying circular loop of radius ' $a$ ' at a point which is at a distance ' $r$ ' from its centre along the axis of the loop.
- Q8 Define mutual inductance and give its SI unit. Derive an expression for the mutual inductance of two long coaxial solenoids of same length wound over the other.
- Q9 Define displacement current. Write an expression for displacement current. Show that the displacement current across an area in the region between the plates and parallel to it is equal to the conduction current in the connecting wires.
- Q10 Draw a labelled ray diagram to show the formation of an image by a compound microscope. Write the expression for its magnifying power.
- Q11 Describe Davisson and Germer experiment to establish the wave nature of electron. Describe a labelled diagram of the apparatus used.
- Q12 Draw a diagram to show the variation of binding energy per nucleon with mass number for different nuclei. State with reason why light nuclei usually undergo nuclear fusion.
- Q13 Explain how Rutherford's experiment on scattering of  $\alpha$ -particles led to the estimation of the size of the nucleus and also define distance of closest approach.
- Q14 With the help of a labelled circuit diagram, explain the use of junction diodes as a full wave rectifier. Draw the input and output waveforms.
- Q15 Describe the different types in which electromagnetic waves can propagate from one point to another.

**Section D ( 5 Marks )**

- Q1 Draw a neat and labelled diagram of cyclotron. State the underlying principle and explain how a positively charged particles gets accelerated in this machine. Show mathematically that the cyclotron frequency does not depend upon the speed of the particle.
- Q2 With the help of a neat and labelled diagram, explain the underlying principle and working of a moving coil galvanometer. What is the function of  
(i). Uniform radial field  
(ii). Soft iron core, in such a device?
- Q3 Using phasor diagram, derive an expression for the impedance of a series LCR-circuit. What do you mean by resonance condition of such a circuit? Find an expression for Q-factor of the circuit.
- Q4 With the help of a labelled diagram, explain the principle, construction and working of an A.C. generator. Derive the expression for induced emf.
- Q5 Derive the relation between distance of object, distance of image and radius of curvature of convex spherical surface, when refraction takes place from a rarer medium of refractive index  $\mu_1$  to a denser medium of refractive index  $\mu_2$  and the image produced is real. State the assumptions used.
- Q6 Draw a graph to show the variation of the angle of deviation ' $\delta$ ' with that of angle of incidence ' $i$ ' for a monochromatic ray of light passing through a glass prism of refracting angle A. hence deduce the expression for the refractive index of the material of the prism in terms of the angle of prism and the angle of minimum deviation.
- Q7 What is an astronomical telescope? Describe its construction and working. Derive its magnifying power when the final image is formed at the least distance of distinct vision. Why should the diameter of the objective of a telescope be large?
- Q8 Using Huygens's principle, explain diffraction of light due to a single slit illuminated by a monochromatic source. Explain the formation of the pattern of the fringes on the screen.
- Q9 Draw a circuit diagram to study the input and output characteristics of an n-p-n transistor in common emitter configuration. Show these graphically.  
Explain how (i) input resistance and (ii) output resistance, are calculated using these characteristics.
- Q10 Define the terms depletion layer and Potential barrier. With the help of labelled diagram, explain the use of a Zener diode as a voltage regulator.