

HIGHER SECONDARY MODEL QUESTION PAPER

H.S.E – II

Max. Marks: 60

PHYSICS

Time: 2 ¼ hrs

1. Match the tables

(4x ½=2)

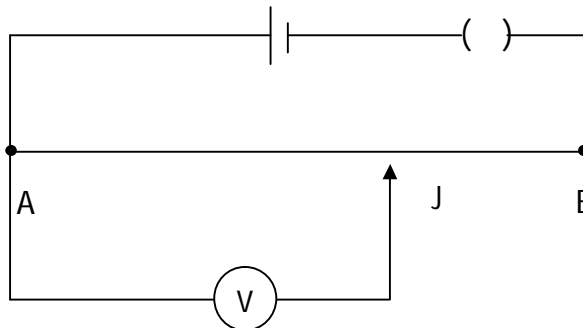
a) Magnetic flux	1) Tesla / m ²
b) Aurora borealis	2) Galvanometer with negligible resistance
c) Metal detector	3) Motion of the charged particle in an earth's magnetic field
d) Ammeter	4) Tesla – m ²
	5) Eddy current
	6) Galvanometer with high resistance

2. Graph of electrical properties of uniformly charged spherical conductor is given below



- a) Identify the quantities in y – axis of (i) & (ii) (1)
- b) Obtain an expression for electric field on the surface of the spherical conductor of charge 'Q' and radius 'R' (3)
- c) There is an air filled IpF parallel plate capacitor, when the plate separation is doubled and the space filled with wax the capacitance increases to 2 pf. Find out the dielectric constant of wax. (2)

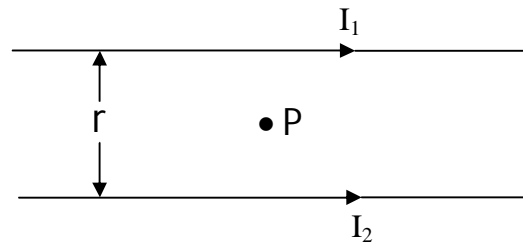
3.



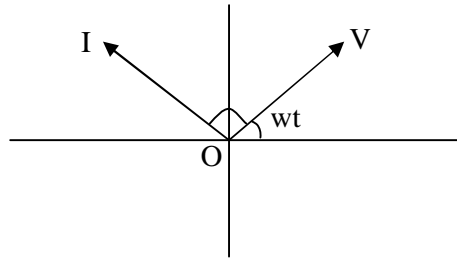
AB is a uniform resistance wire of length 100 cm. figure shows circuit arrangement

- a) What will happen to voltmeter leading when jockey moves from A to B (1)
- b) Make necessary change in the above diagram to compare the emf of two cells and explain how can you compare emf? (3)

4. Two infinitely long wires carrying currents in same direction are arranged as in figure



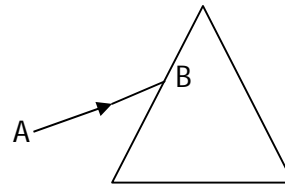
- a) What is the nature of the force between the wires (1)
- b) Obtain an expression for force per length between the wires (2 ½)
- c) What is the magnitude of magnetic field at a point P, midway between two wires, of $I_1 = I_2 = 2A$ and $r = 2 m$ (1 ½)
- d) Why do solenoid tend to contract when current passes through it (1)
5. a) A compass needle placed in horizontal plane in the earth's magnetic field. It will align
- a) Geographic N – S pole
- b) Magnetic N – S
- Explain your answer? (1)
- b) A dip circle is placed at a place such a way that its magnetic needle is parallel to the magnetic meridian. Its needle stands 90° to the horizontal. Is the place magnetic pole or magnetic equator? Explain why it is so? (1)
6. "Whenever the magnetic flux linked with a coil changes an emf will induced in it".
- a) State the law which gives the direction of induced emf in the coil (1)
- b) Determine the direction of induced current in the situations described in the following figure (1½)
- A wire of irregular shape forming into a circular loop as shown in figure
-
- c) A bar magnetic is falling freely through a closed copper coil. Raju argues that acceleration of the magnet is greater than 'g'. Do you agree with this statement? Justify (1 ½)
- d) If a cut is made in the above coil, what is the acceleration of the magnet? (1)
7. The phasor diagram for a circuit element with alternating voltage $V(t) = V_0 \sin \omega t$ is given



- a) Identify the circuit element used in A.C (1)
 - b) Draw the phasor diagram of a series LCR circuit when AC source is applied and obtain the equation for the impedance of the circuit (3)
 - c) Redraw the phasor diagram of LCR circuit at resonance. (1)
8. You are given two lenses having powers $P_1 = 6\text{ D}$ and $P_2 = 12\text{ D}$
- a) What you meant by power of a lens (1)
 - b) Obtain the expression for the effective power of two lenses having powers P_1 and P_2 kept in contact. (2 ½)
 - c) Which of the above two lenses will serve as the objective of a microscope? Why? (1½)
 - d) A sun glass has two curved surfaces. Yet its power is zero. justify. (1)

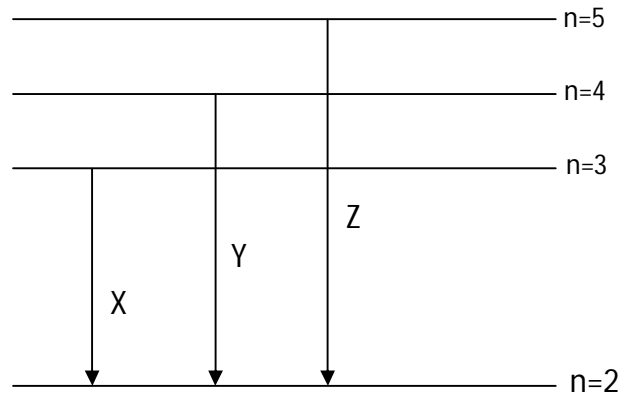
OR

Figure shows an equilateral prism. AB is the ray incident on one of the faces



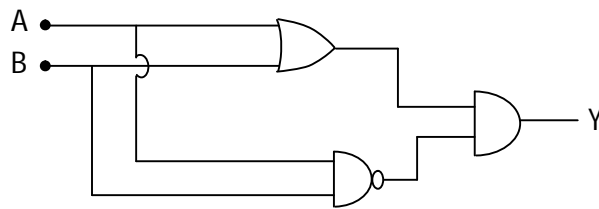
- a) Complete the ray diagram and mark the angle of incidence and angle of deviation (1)
 - b) Obtain an expression for the refractive index of the material of the prism (3)
 - c) One face of prism of refracting angle 30° and refractive index 1.414 is silvered. At what angle a ray of light must be fall on the unsilvered surface so that the ray retraces its path after reflection at the silvered surface. (2)
9. When light travels from one medium to another it deviate from its original path.
- a) Which parameter light remains constant for the two media. (1)
 - b) Using Huggens principle explain the law of refraction. (2)
 - c) Which phenomenon leads us to the conclusion that light is transverse in nature? (1)
10. A plane electromagnetic wave travels in vaccum along the Y direction.
- a) What is the ratio of magnitudes of electric and magnetic field vectors? (1)
 - b) What is the directions of the above vectors (1)
11. When light having sufficient frequency falls on a metal surface electrons are emitted from it
- a) Photo electric current increases with (½)
 - b) Obtain Einstein's photo electric equation (2)
 - c) An electron microscope uses electrons accelerated by a voltage of 50 KV. (1½)
 - d) Determine the de-Broglie wavelength of electron? (1½)

12. The energy band diagram of Hydrogen-Spectrum is given below.



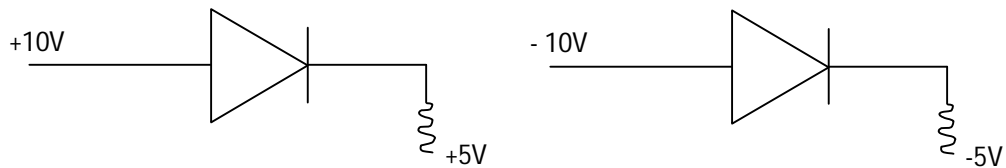
- a) Fig shows series of Hydrogen spectrum (1)
- b) Which of the above transition has maximum frequency. Justify. (2)
- c) Obtain the ratio of nuclear radii of ${}_{26}\text{Fe}^{56}$ and ${}_{92}\text{U}^{238}$. Also find the ratio of their nuclear densities. (2)

13. Write the truth table of the given gate. (2)



14. A diode can be used convert AC to DC

- a) Identify the forward and reverse biased diode (1)



- b) With the help of a neat diagram explain how diode can be used as a fullwave rectifier. (3)

15. "In medium wave radio transmission mainly Amplitude modulation is used".

- a) What is the Amplitude modulation? (1)
- b) What is the need for modulation? (2)