HIGHER SECONDARY MODEL EXAMINATION FEB 2012
PHYSICS- BATCH V

HSE –II

Max. Marks :60
Time: 2 ¼ Hrs

I. An equal and opposite charges separated by a short vector distance is called an electric dipole

a) What is the unit of dipole moment (1)

b) Obtain an expression for the electric field due to the dipole along the axial line of it (3)

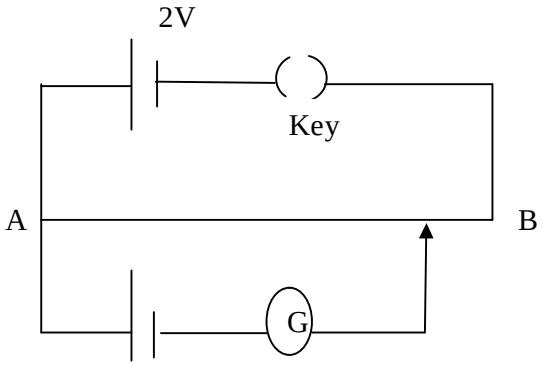
c) If total force and torque are not equal to zero when it is placed in an external E.F. Identify the nature of the field (1)

II. a) Unit of electric potential is _____ (1)

b) Obtain an expression for the electric potential due to an electric dipole (3)

c) Draw the equi potential surface of an electric dipole (1)

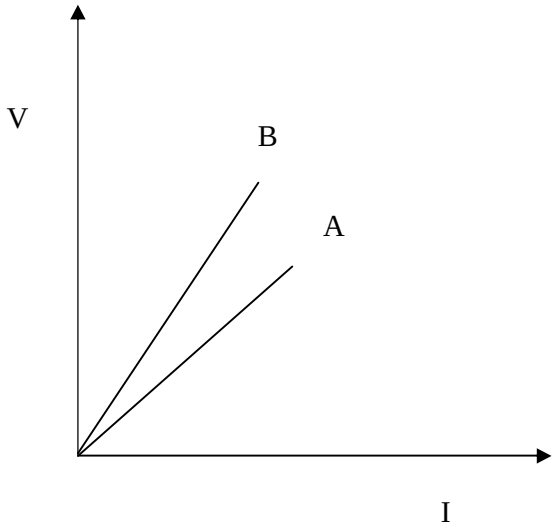
III. A potentio meter wire of length 1meter is shown in figure



a)What do you meant by potential gradient and determine potential gradient across AB (2)

b) How will you modify the above circuit diagram to compare the emfs of two cells (2)

IV. V- I graphs for parallel and series combinations of two metallic resistors are shown in figure



a) Which graph represnts series combination (½)

b) Which graph represents parallel combination. Justify your answer? (1 ½)

V. Ampere circuited therorem is generally used to determine the mag field produced by a current carrying element

a) State ampere's circuital theorem (1)

b) Obatin an expression for the mag. Field procedure by an infinitely long straight conductor carrying current (2)

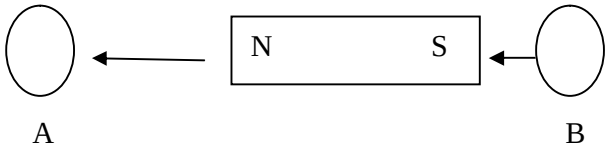
c) A long straight conductor carries a current 35 A. Find the mag. Field produced due to this conductor at a point 20 cm away from the centre of the wire (2)

VI. An emf included in a conductor when magnetic flux associated with it changes

a) State faraday's laws of electro magnetic induction (1)

b)Derive an expression for self induelane of a solenoid of N turns (2)

c) Predict the direction of induced emf in the coils A and B



d) Obatin an expression for the magnetic energy stored in a solenoid in terms of magnetic field B, area A, and length 'l'

of the solenoid (2)

VII. Electro magnetic waves carry both energy and momentum like other waves

a) Arrange the following waves in the increasing order of energy.

Radio waves, UV, ι- rays, microwaves (1 ½)

b) The magnetic field in a plane E.M. wave is given by = 2×10^{-7} sin (0.5 X $10^{3}x+1.5\ 10^{11}t$) tesla. Write an expression for electric field (1 ½)

VIII. Brewsters law gives the relationship between angle of polarization and refractive index of the material

a) State Brewster's law (1)

b) What is meant by plane polarized light. Describe a method for producing a beam of plane polarized light (3)

c) The polarizing angle for a medium is 60^{0}. What will be the refractive index of the medium (1)

IX. A ray of light travels from one medium to another, it deviates from it path.

a) Name the phenomenon ($^{1}/_{2}$)

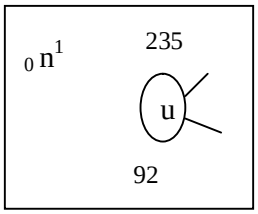
b) Derive len's makers formula (2 ½)

c) A convex lens having focal length 10 cm is immersed in water. Find its power (given nw = 1.33) (2)

X. Nuclear reactions in heavy nuclai can be brought about by colliding the nucleus with neutrons. The neutron number can be made to increase in such a reaction.

a) What is chain reaction (1)

b) Complete the diagram showing the products of nuclear fission (1 ½)



c) If all the neautrons released in this process are causing friction once again, calculate total energy released during second stage. (Mass defect in one fission process is 0.216 amu) (2 ½)

XI. Ture/ False

a) Einsteins photo electric equation states that Ek= hr – Q. Where Ek is the maximum K-E.

b) The stopping potential depends on the surface of metal only (1)

XII. Light meters in photographic camers make use of photoelectric effect

a)What is photo electric effect? (1)

b) Which of the following is a photo sensitive material

(quartz, caesium, germanium, silicon) ($^1/_2$)

c) Represent graphically the variation of photoelectric current with the intensity of the incident radiation

d) Red light however bright can not produce emission of photo electrons from a clear zine surface. But even a weak u.v. radiation can do. Do you agree with the statement why? (1½)

XIII. Diodes are used to convert A.C. to D.C. The process is called rectification

a) Why diodes are used as rectifier (1)

b) Discuss the working of a full wave rectifier (3)

c) In an a.c. input signal of frequency 60 H_z, is rectified by a half wave and full wave rectifier what is the output frequency in each case (2)

XIV. H metal or a semiconductor form a crystalline structure. In this condition the atoms share electrons. The electrons will be in different energy levels called bands

a) What is an energy band (1)

b) What are balance band and conduction band (2)

c) How would you distinguish metals, semiconductor and insulator based on band theory (2)

XV. A microphone is a transducer. What is the use of a transducer? (1)

KASARAGOD (DISTRICT)

CLUSTER I & II