HIGHER SECONDARY MODEL EXAMINATION FEB-2012

PART III

PHYSICS

Reg. No:. ……………………

Name : …………………….

General Instruction to Candidates :

There is a 'cool-off time' of 15 minutes in addition to the writing time of 2 Hrs.

You are not allowed to write your answer nor to discuss anything with others during the 'cool-off' time.

Use the 'cool-off' time to get familiar with questions and to plan answers.

Read questions carefully before answering.

All questions are compulsory and only internal choice is allowed.

When you select a question, all the sub- questions must be answered from the same question itself.

Calculations, figures and graphs should be shown in the answer sheet itself.

Max Score : 60

HSE (II)   Time : 2 Hours

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1. To explain the stability and the spectrum of an atom, Neil Bohr applied Planck's quantum theory of radiation to Rutherford's atomic model.He made some assumptions popularly known as Postulates of Bohr's atom model.

  (a) What is the shape of the orbit of an electron?

  (b) What is the work done by the electric field of a nucleus, in the complete path of an electron?

  (c) In which form is the energy radiated, when an electron jumps from higher energy orbit to lower energy orbit.

  (c) "The radius of an orbit is directly proportional to the square of the principal quantum number of the orbit". Justify this statement.

(1+1+1+3= 6 Score)

2. A physics teacher conducted transistor characteristic experiment in lab.Teacher asked the students to draw the circuit diagram of this experiment.Teacher noticed that Rahul has drawn the wrong circuit diagram in his practical diary.
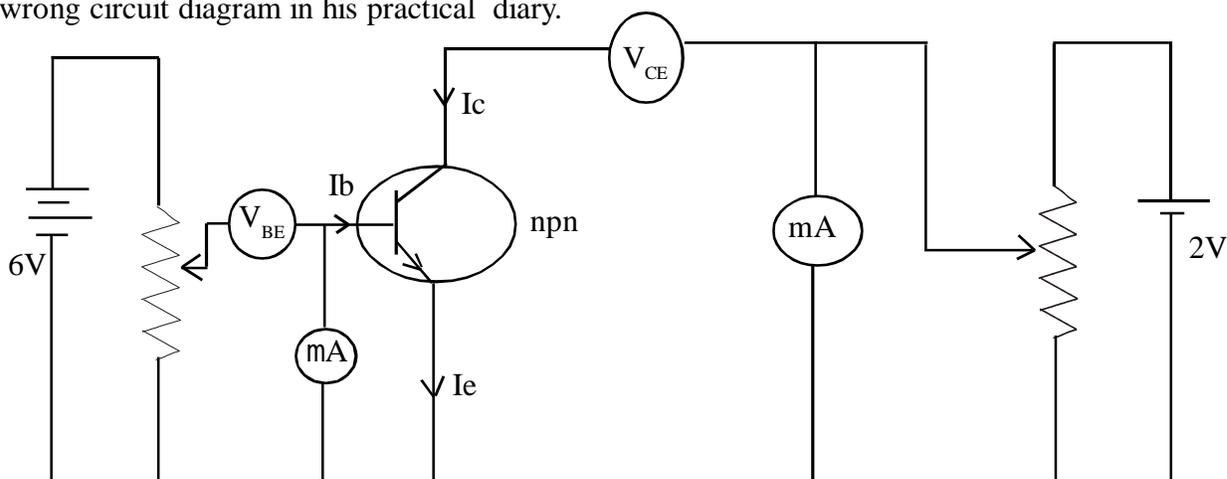
  (a) Correct Rahul's circuit diagram.

  (b) In which mode (CB, CC and CE) is the transistor connected.How will you identify this?

  (c) Teacher gave all apparatus and box containing diode, IC, capacitor, transistor.How will the studen detect transistor from other semiconductor devices.

(d) Students measured the current between Emitter-Base and Collector- Base with multimeter. In which case does the multimeter show more current.Explain your argument.

(e) Draw the i/p and o/p characteristic curve, if they had performed the experiment in the correct way.

$(2 +1+1+2 + 2= 8$ Score$)$

3.Two students prepared daniel cell with same condition, but different potential.Difference of two cell is different due to internal resistance of the cell.

(a) What is meant by internal resistance of the cell?

(b) What are the factors depending on internal resistance of the cell?

(c) Potentiometer is the most suitable device for measuring internal resistance of the cell. Explain the measurement of internal resistance of cell with circuit diagram.

(d) Potentiometer is some times called as ideal voltmeter.Give the reason for this.

$(1 + + 1.5 + 3 + 1.5= 7$ Score$)$

4.In convex lens experiment, to find the focal length of the lens in different method is conducted in lab.

(a) How can you distinguish convex lens from the given lens.

(b) In u-v method when v changes with u, a real image is formed on the screen.But in this change of object, there is no image found on the screen.In which position is the object placed? Draw the diagram and mention the properties of image.

(c) The image of a needle placed 10cm from a convex lens is formed on a screen 20cm on the other side of the lens.What is the focal length of the lens? Is there any change in focal length when this experiment is conducted in water.Justify your answer.(Refractive index of glass is 1.51 and that of water is 1.33)

$(1 + 2+ 3 = 6$ Score$)$

OR

5.A ray of sun light (unpolarised light) passes through a parallel sided glass slab.At B incident light is partially reflected and partially refracted.The reflected and refracted light are unpolarised. The value of i increases till a particular value when reflected light is completely polarised.
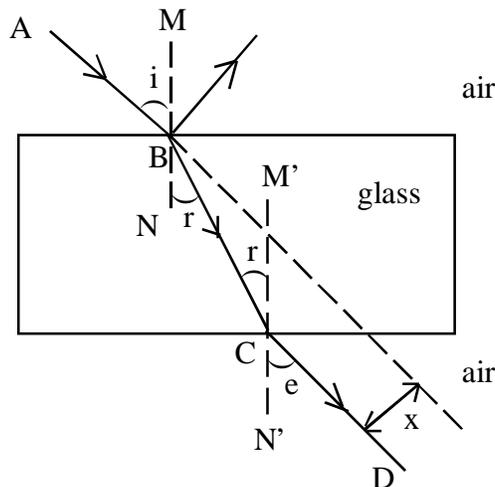
(a) Name the angle of incidence at this stage.

(b)In this stage, there is a relation between incident angle and refractive index of the glass slab. Derive that relation.

(c) "Emergent angle is equal to the incident angle".Justify this statement.

$(1 + 3 + 2 = 6$ Score$)$

6.An earthed metal plate of area 'A' is brought near the positively charged metal plate of area 'A'. This device is called parallel plate capacitor.

(a) Which function is done by the capacitor in an electrical circuit.

(b) Derive the capacitance of this capacitor.

(c)Which method is the most suitable for increasing the capacitance of a capacitor.

$(1 + 2.5 + 1.5 = 5$ Score$)$

7.When proton is moving in an uniform magnetic field with initial velocity, the path of the beam will be circular.
   (a) What is the angle between direction of velocity and magnetic field in the case of circular path of proton?
   (b) There is no change in the energy of a proton.Is it true or false? Explain.
   (c) Proton movement taken in cyclotron device is perpendicular to the uniform magnetic field. Hence the energy of the proton changes.Why? Name the shape of the path.
   (d) Cyclotron is not suitable for increasing the velocity of neutron.Justify.

$(1 + 1.5 + 2.5 + 1 = 6$ Score$)$

8.Micro wave is the most useful wave in electromagnetic spectrum.Radar, mobile, microwave oven etc are working with micro waves.
   (a) "Micro wave's wavelength is very small'.Do you join with this statement.
   (b) Two-wire line is not used to radiate micro wave.Explain.
   (c) "Micro waves are harmful to the human beings".Justify this statement.
   (d) Micro wave is not suitable to transfer information in long distance.Why?
   (e) Modulation is required for long distance information transfer.Which modulation is most suitable for stereo sound transmission?
   (f) If f_c is the carrier frequency and f_s is the signal frequency, what is the frequency of
       (i) upper side band   (ii) lower side band in an amplitude modulated wave.

$(1 +1+1.5+1.5 + 1 + 1= 7$ Score$)$

9.An electric lamp connected in series with a capacitor and an AC source is glowing with certain brightness.
   (a) How does the brightness of the lamp change on reducing the capacitance?
   (b) Is there any ohmic resistance offered by the capacitor?
   (c) What is the expression for resistance offered by the capacitor?
   (d) What is the phase difference between the voltage and the current passing through the capacitor?
   (e) An ordinary moving coil ammeter used for DC cannot be used to measure an AC even if its frequency is low.Explain. $(1.5 + 1 + 1+ 1 + 1.5= 6$ Score$)$

10.Earth's atmosphere can be classified in different layers and are called by different names
   (a) Give the names of the different layers of the atmosphere.
   (b) Which layer is used for sky wave propagation?
   (c) Space waves are the highest frequency waves compared to the other electromagnetic waves. Is the space wave transverese or longitudinal? Does it require a medium?

$(1 + 1 + 1 = 3$ Score$)$

11.Till the discovery of photoelectric effect all phenomenon of light was explained with wave and Corpuscular theory.Einstein satisfactorily explained photoelectric effect and was awarded with the nobel prize for his explanation.
   (a) Which theory is used for his explanation of photoelectric effect.
   (b) Photoelectric effect takes place only when particular frequency of radiation incident on the metal surface.Give the name of this particular frequency.
   (c) Is there any change in photoelectric current with various factors like intensity of the incident radiation, potential, frequency.Explain with graphs.
   (d) "There is a time lag between photoelectric emission process".Do you agree with this statement.Explain. $(1 +1+ 3+1 = 6$ Score$)$

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