HIGHER SECONDARY MODEL EXAMINATION 2012
Part – III
PHYSICS
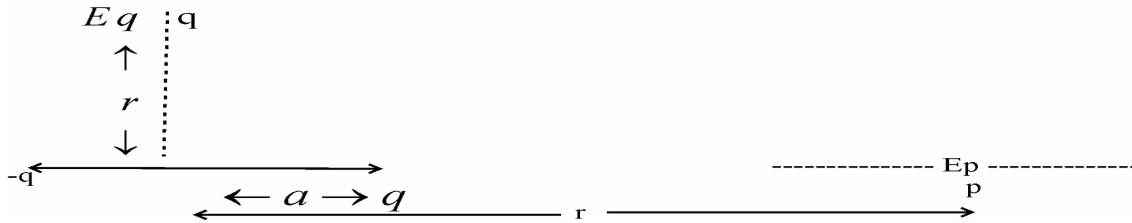
Maximum Score : 60

12 HSE

Time: 2 Hours
Cool-off Time : 15 Minutes

1.a) Define an electric dipole.

   b)In the figure Ep and Eq are the electric fields at the same distance r on axial and
        equatorial planes respectively due to the dipole. Calculate the ratio of the fields   (2)
2. A cell and two resistors R_1 and R_2 are provided to you.
a)Draw the different combinations of resistors using R_1, R_2 and the cell   (1)
 b) Derive the expression for the effective resistance of the circuit in which current is the
same on both resistors   (2)
c) If R_1 = 4W and R_2 = 6W in which combination the effective resistance is minimum?
Find its value.   (1)
3 . The magnetic field due to a current carrying conductor can be determined by a famous law .
a) State the law.   (1)
b) Sate the rule which helps to find the direction of magnetic field acting at a point near a
current carrying conductor.   (1)
c)How will the magnetic field intensity at the center of a circular coil carrying current change if
the current through the coil is doubled and the radius halved .   (2)
4. Cyclotron is a particle accelerator which works on the basis of Lorentz force.
a) Which one of the following elementary particle cannot be accelerated using
cyclotron ?
1. Proton   2. Neutron   3. Alpha particle   (1)
b) Explain how does the cyclotron accelerate a particle when the electric field between the dees
interchange   (2)
c) Particles like electrons are not practically accelerated using a cyclotron to very
high energies . Why ?   (1)
5. Two metal plates X and Y of the area 'A' are separated by a distance 'd', charged + and -
respectively.
a) This arrangement is called ....   (1)
b) The arrangement stored energy in the ....   (1)
(Magnetic field, Electric field, Electromagnetic field, Gravitational field)
c)Derive an expression for the energy stored the arrangement   (2)

d)When we increase separation between two plates by keeping V constant, what happens to
total energy stored in the system   (1)
6). A freely suspended bar magnet aligned in north-south direction, i.e, north pole of magnet

indicates north-ern side of earth.

a) What is the direction of earth's magnetic field?

b) Explain three magnetic elements of earth.

c) Write any one of the causes of earth's magnetism?

d)What in the alignment of a freely suspended magnet at geographic north pole of earth? (4)

7.. A solenoid is a insulated copper wire wound in the form of cylinder.

a) When current increases flux linked with the solenoid is ....

b) Derive an expression for inductance of a solenoid

c) Calculate the inductance and energy stored in the magnetic field of a air cored solenoid 50cm in diameter and 50m in length wound with 1000 turns, if it is carrying a current of 9A. (5)

8.(a) What is the inductive reactance of a solenoid carrying dc? (1)

b) Obtain the phase relation between current and voltage when ac flowing through a capacitor?

c) What is the power factor of LCR circuit at resonance? (3)

d) A bulb is connected in series with an ideal inductor. How the bulb glows if AC or DC. Is connected to the circuit? (1)

9. (a) Name any 4 electromagnetic waves in the increasing order of there frequencies (2)

(b) what is the ratio of speed of gamma rays and radio waves in vacuum? (1)

10.Consider the refraction in a glass prisom.

(a) Obtain a relation for the deviation of a ray of light. (2)

(b) Obtain a relation for the refraction angle of the prison (1)

(c) Prove the relation n = [Sin (A+D)/2]/Sin(A/2) (2)

10. Young's double slit experiment demonstrates the interference of light.

(a) Give the conditions to be satisfied for getting sustained interference pattern. (1)

(b) Obtain the conditions for maxima and minima. (2)

(c) What change would you expect in the fringe width if whole of the apparatus of Young's double slit experiment is immersed in water? Justify. (2)

11. "Moving particles of matter shows wave like properties under suitable conditions"

a). Who put forword this hypothesis ? (1)

b). Explain the experiment that provide this hypothesis (2)

c)A proton and an electron have been accelerated through same potential. Which one have higher matter wave length. Write the reason (2)

12.The line spectrum of hydrogen was successfully explained by Bohr.

a) What are the postulates of the above model? (2)

b) Write the expression for energy and radius of orbit. (2)

c)Find the longest wavelength in Lyman series and radius of second energy level. (2)

13. A diode can be properly doped at the time of its manufacture, so that it have a sharp break down voltage

a) The above diode is called (1)

(i) Zener diode (ii) Photo diode (iii) Light emitting diode (iv) Solar cell

b) Compare V-I Characteristics of above diode with that of an ordinary diode (2)

c) Explain how the above diode can be used as an voltage regulator (2).

14. In the process modulation, any one quality of the carrier wave is varied accordance with the message signal.

(a) Comment on need for modulation (2)

(b) Draw the diagram of a simple amplitude demodulator and explain its working. (2)