INTERNATIONAL INDIAN SCHOOL – DAMMAM

FIRST TERMINAL EXAMINATION 2014

Subject – physics

Class – XII

SET- A

Time : 3 hours **Max Marks: 70**

General Instructions :

a) All questions are compulsory.

b) There is no over all choice .However an internal choice has been provided in one question of two marks,one question of three marks,all three questions of five marks

c) Question no 1 to 5 are very short answer type questions carrying 1 mark each.

d) Question no 6 to 10 are short answer type questions carrying 2 marks each.

e) Question no 11 to 22 are short answer type questions carrying 3 marks each.

f) Question no 23 is a value based question carrying 4 mark

g) Question no 24 to 26 are long answer type questions carrying 5 marks each.

h) Use of calculator is not permitted.However you may use log table if necessary.

1 What is the amount of workdone in moving a 100nC charge between two points 5cm apart in an equipotential surface?

2 If the number of turns of a solenoid is doubled,keeping the other factors constant.How does the self inductance of the solenoid changes?

3 Why electromagnets are made of soft iron?

4 Why does the electicfield inside a dielectric decrease when it is placed in an external electricfield?

5 The force experienced by a particle of charge q moving with velocity v in a magnetic field B is given by F=q(VxB).Of these name the pairs of vectors which are always at right angles to each other.

6 How does conductivity of a semiconductor increase with temperature?

7 A conducting rod of length l is moved in a magnetic field of magnitude B with a velocity v such that the arrangement is mutually perpendicular.Derive the expression for emf induced in the rod.

8 A 100w and a500w bulbs aer joined in series and connected to the mains.Which bulb will glow brighter?Why?

9 Does Lenz`s law violates law of conservation of energy.Explain.

OR

Prove that the energy stored in an inductor is given by 1/2 $LI^{2.}$

10 Distinguish between a diamagnetic substance and a paramagnetic substance stating two ponts of difference.

11 What is mutual inductance?Derive the expression for mutual inductance of two long coaxial solenoids.

12 A beam of α particles and of protons ,of the same velocity v,enters a uniform magnetic field at right angles to the field lines.The particles describe circular paths.Calculate the ratio of the two paths.

13 Define the term elecric field intensity.Derive the expression for electric field intensity at a point on the axis of an electric dipole.

14 Derive the expression for effective emf and internal resistance if the cells are connected in parallel.

15 Two straight parallel current carrying conductors are kept at a distance d from each other in air.The direction of current in both the condutors is the same.Find the magnitude and direction of force between them.Hence define one Ampere.

OR

Derive the expression for magnetic field due to a circular current carrying coil on the axis of the coil.

16 *A* spherical conductor has a radius 12 cm has a charge of 1.6×10^{-7}C distributed uniformly on its surface.What is the elecric field
a)inside the sphere.
b)just outside the sphere.
c)at a point 18cm from the centre of the sphere.

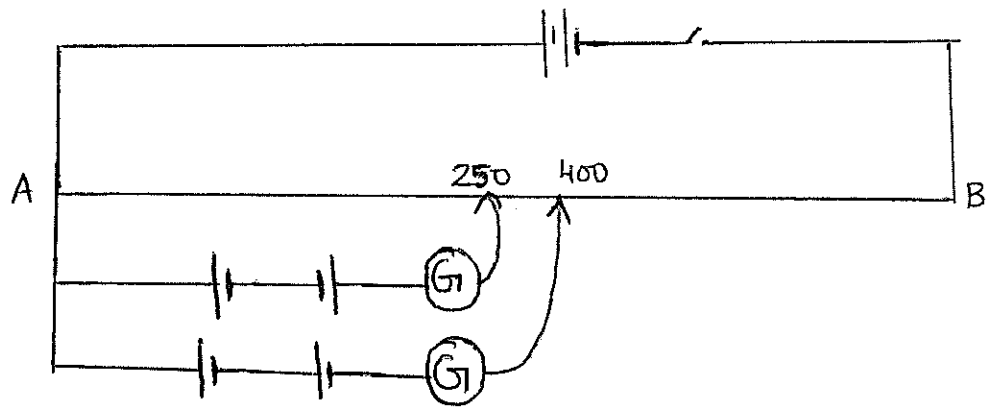
17 Establish a relation between resistivity and relaxation time.

18 With the help of a labelled diagram explain the principle and working of moving coil galvanometer.

19 A toroid has a core of inner radius 6 cm and outer radius 10cm around which 500 turns of wire are wound.If the current in the wire is 11A ,what is the magneticfield
a)outside the toroid.
b)inside the core of the toroid.
c)in the empty space surrounded by the toroid.

20 A parallel plate capacitor is charged to a potential difference v by a dc source.
The capacitor is then disconnected from the source.
If the distance between the plate is doubled,state with reason how the following will change
a)electric field between the plates
b)capacitance
c)energy stored in the capacitor.

21 Two primary cells of emf E_1 and E_2 ($E_1>E_2$) are connected to the potentiometer wire as shown



If the balancing lengths for the two combinations of the cell are 250cm and 400cm, find the ratio of E_1 and E_2.

22 Derive the expression for potential energy of a dipole in a uniform elecric field and hence give the stable and unstable equilibrium cinditions.

23 Shama, a science student, while studying, was impressed that the nervous system in animals depends on the electrical signals to work.Neurons pass on signals from sense organs to the brain.The passage of an electrical signal constitutes an electric current.Shama was curious to know the range of currents in different situations.During lightning the electric current is in tens of thousands of amperes,while in the nervous system,it is only a few micro amperes.She further discussed with her teacher about the magnitude of magnetic field created by these currents.

a)What are the values shown by Shama?

b)A galvanometer coil has a resistance of 15 ohm and the meter shows full scale defclection for a current of 4mA.How will you convert the meter into an ammeter of rangr 0-6A?

24 a)What is Wheatstones bridge?Deduce the condition for the bridge is balanced.

b)A battery of emf 10V and internal resistance 3Ω is connected to a resistor.If the current in the circuit is 0.5A,what is the resistance of the resistor?What is the terminal voltage of the battery when the circuit is closed?

OR

a)State the principle of potentiometer.Explain with the help of a circuit diagram,how the internal resistance of the cell is calculated using potentiometer.

b)A current of 1mA is flowing through a potentiometer wire of length 4m of resitance 4Ω,find the potential gradiant of the potentiometer wire.

25 a)State Ampear`s circuital law.Using this law get an expression for magnetic field due to a long straight current carrying wire.

b)An electron travels with a speed of $4x10^4$m/s parallel to the wire at a distance of 0.1m from it in direction opposite to the electric current.What force does the magneticfield of the current exert on the moving electron?

OR

a)Define the terms magnetic declination and horizontal component of earths magnetic field at a place.Establis a relation between the magnetic inclination and horizontal component of earth`s field with the help of a diagram.

b)The vertical component of earth`s magnetic field at a place is √3 times the horizontal component.What is the value of angle of dip at this place?

26 An electric dipole is held in a uniform electric field

i)Show that no translatory force acts on it.

ii)Derive an expression for the torque acting on it,

iii)The dipole is aligned parallel to the field.Calculate the workdone in rotating the dipole a)through 90° b)through 180°

OR

State Guass`s theorm in electrostatics and expressit mathematically .Using it derive an expression for electric field at a point near a thin infinite plane sheet of charge.How does this electric field change for a uniformly thick sheet of charge?