INTERNATIONAL INDIAN SCHOOL – DAMMAM

I TERMINAL EXAMINATION JUNE 2012

CLASS – XII

PHYSICS

Time Allowed : 3 hours *Maximum Marks : 70*

SET-'A'

General Instruction:

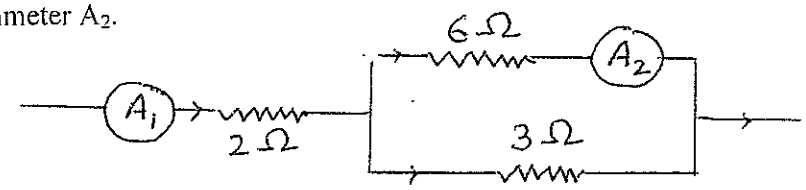
(i) *All questions are compulsory.*
(ii) *There is no over all choice. However an internal choice has been provided in one question of two marks, one question of three marks, all three questions of five marks.*
(iii) *Question number 1 to 8 marks are very short answer type questions, carrying one mark each.*
(iv) *Question number 9 to 18 short answer type questions, carrying two marks each.*
(v) *Question number 19 to 27 are short type questions, carrying three marks each.*
(vi) *Question number 28 to 30 are long type question, carrying five marks each.*
(v) *Use of calculator is not permitted. However you may use log table if necessary.*

1. An electron is revolving in a circular path with a frequency 10^4rps. How much is the current (in ampere) in the loop?

2. Determine the direction of induced current in the loop given below:

3. State Gauss theorem in magnetism. What is its significance?

4. In the circuit shown, if the reading of ammeter A_1 is 6 A, then what is the reading of ammeter A_2.



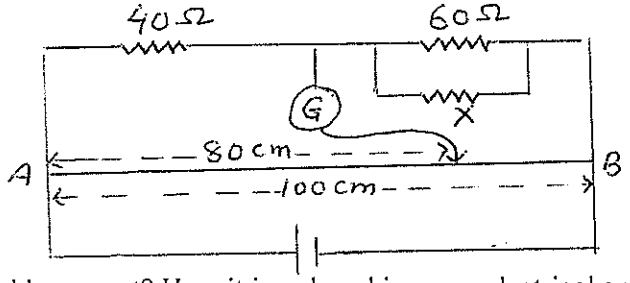
5. A hollow sphere of radius R has charge Q on its surface. What is the value of (i) electric field, and (ii) electric potential, at the centre of the sphere.

6. Resistance of a metallic conductor increases with temperature,why?

7. How does the angle of dip vary when we move from earth's one magnetic pole to another pole along its surface?

8 How does the capacitance of a parallel plate capacitor change when the separation between the plates is reduced to one third of its initial value?

9. In the figure shown, if the galvanometer shows zero deflection, then find the value of X.



10. What is eddy current? How it is reduced in some electrical appliances?

11. Steel is preferred for making permanent magnets whereas soft iron is preferred for making temporary magnets. Give reasons.

12. Obtain an expression for the electric field due to a large charged sheet of surface charge density σ by using Gauss theorem.

13. Write expressions for the magnetic field at point inside and outside a current carrying thick conductor. Also draw graph showing the variation of magnetic field with the distance from the axis of the current carrying thick conductor.

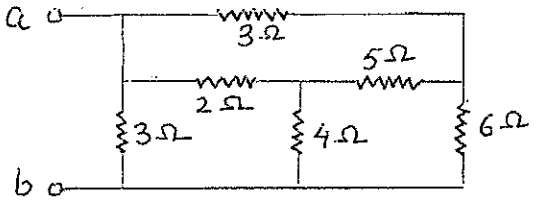
14. A charge q moving in a straight line is accelerated by a potential difference V. It enters a uniform magnetic field B perpendicular to its path. Deduce in terms of V an expression for the radius of the circular path in which it travel.

15. What is lenz law? Show that it is in accordance with the conservation of energy.

16. A copper wire is stretched to make it 10% longer, what is the % change in its resistance?

OR

Find the equivalent resistance between point a and b in the network shown.

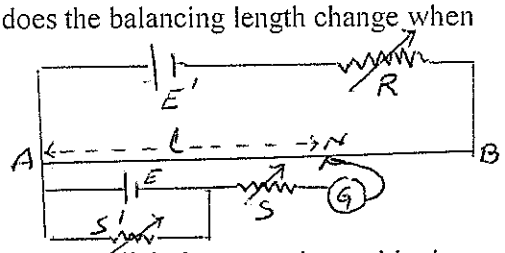


17. An electric dipole is rotated in a region of uniform electric field from its stable to unstable equilibrium position. Write expression for the work done for this process. Mention that whether energy is consumed or released in this process.

18. A rod of length l is rotated in a plane perpendicular to the magnetic field about an axis passing through its one end and perpendicular to its length with angular velocity ω. Obtain expression for the emf developes across its length.

19. What do you understand by the electric potential at a point? How it is related to electric field? Why is electric potential inside a charged spherical conductor constant?

20. In the given potentiometer circuit, how does the balancing length change when
(i) R increases
(ii) S increases
(iii) S' increases
Justify your answer.



21. Drive an expression for the energy stored in a parallel plate capacitor, with air as the medium between the plates. Also show that the energy density for this capacitor is $\frac{1}{2}(\varepsilon_0 E^2)$ where E is the electric field.

22. State Wheat stone balanced bridge condition. Prove this by using Kirchhoff rule.

23. Obtain an expression for the magnetic field on the axis of a current carrying circular loop.

OR

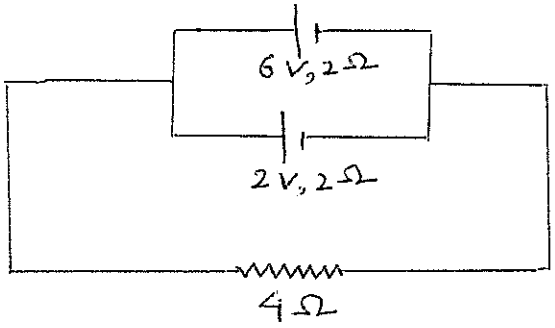
Obtain an expression for the magnetic field due to a current carrying toroidal solenoid.

24. A long straight wire AB carries a current of 4A. A proton P travels at 4×10^6 m/s, parallel to the wire, 0.2 m from it and in a direction opposite to the current. Calculate the force which magnetic field of current exerts on the proton. Also specify the direction of the force.

25. A point charge 10μC is kept at the centre of a hollow sphere of radius 20cm. Calculate the value of electric flux coming out of this sphere. How is this flux affected when (i) radius of the sphere is doubled, (ii) another point charge 10 μC is placed at a distance 25cm from the centre of this sphere?

26. What is self induction? Obtain an expression for the inductance of a coil of length l, area of cross section A and number of turn per unit length n.

27. In the circuit diagram shown find the equivalent emf of the combination of two cells and their common terminal potential. Also find the current across the cell of emf 6V.



28. (a) Obtain an expression for the capacitance of a parallel plate capacitor.

(b) A parallel plate capacitor of capacitance 20μF is charged by a battery of 12V.Calculate the charge and energy stored in it. How will these two change if the capacitor is disconnected from the battery.

OR

With the help of a neat labelled diagram, explain the principle and working of Van de Graff Generator.

29. (a) Explain with proper circuit diagram, the principle and method for finding the internal resistance of a cell by using potentiometer.

(b) For determining emf of a cell we use potentiometer not voltmeter. Explain why?

OR

(a) What are drift velocity and relaxation time for the free electrons in a conductor carrying current? Establish a relation between drift velocity and current.

(b) Show mathematically that the terminal potential of a cell becomes zero when it is short circuited.

30. Derive a mathematical expression for the force per unit length experienced by each of the two long parallel conductors in which current is flowing in the same direction. Also draw diagrams showing the direction of currents, magnetic fields and the corresponding forces on the conductors.
Define one ampere of current.

OR

(a) Write three points of difference between Dia-, Para- and Ferro-magnetic materials.

(b) Define Curie temperature and perfect Diamagnetism.

Some important physical constants :

$c = 3 \times 10^{8}\ ms^{-1}$ $h = 6.626 \times 10^{-34}\ Js$
$e = 1.6 \times 10^{-19}\ C$ $\mu_0 = 4\pi \times 10^{-7} TmA^{-1}$
$m_e = 9.1 \times 10^{-31}\ kg$ $m_p = 1.6 \times 10^{-27}\ kg$
$m_n = 1.675 \times 10^{-27}\ kg$ $\varepsilon_0 = 8.854 \times 10^{-12} C^2N^{-1}m^{-2}$
Avogadro's number $N_A = 6.023 \times 10^{23}\ mol^{-1}$
$1/4\pi\varepsilon_0 = 9 \times 10^{9}\ Nm^2C^{-2}$

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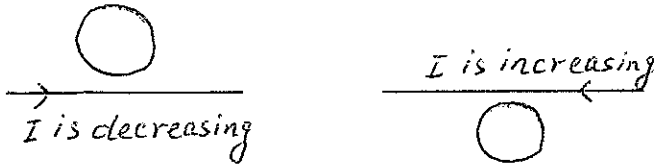

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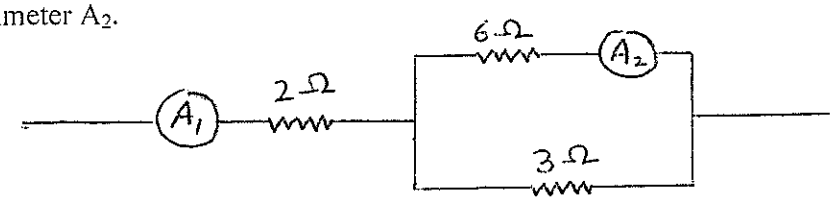

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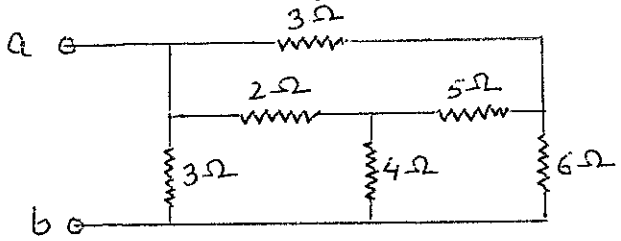

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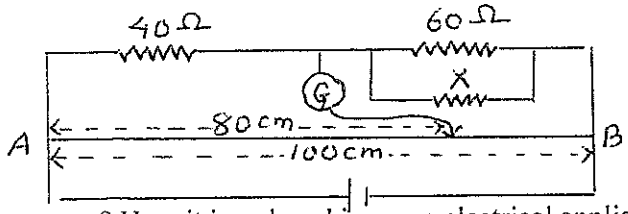

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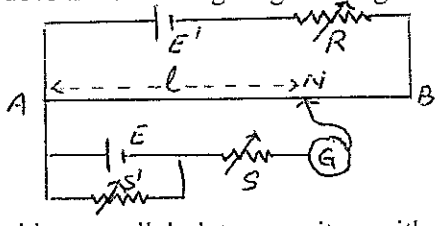

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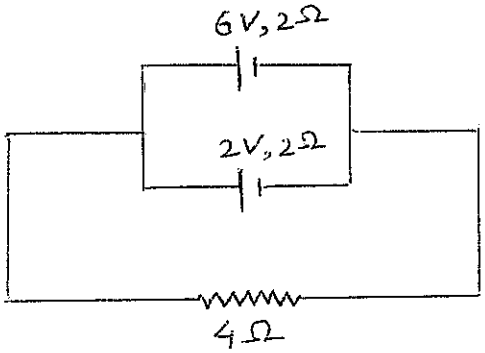

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