PAPER – II (JUNE – 2010)

Time : 3 Hours Max.Marks : 60

SECTION – A

Note : i) Answer **all** the questions. $10 \times 2 = 20$

ii) Every correct answer carries 2 marks.

iii) All are Very short answer type questions.

1. What is an optical fibre? State its principle.
2. The refractive indices of glass and water are 3/2 and 4/3 respectively. Find the refractive index of water with respect to glass.
3. Distinguish between uniform and non – uniform magnetic fields. Give examples.
4. Three capacitors of capacitances $4\mu F, 6\mu F, 8\mu F$ are connected in parallel.

   a) What is the ratio of charges?

   b) What is the ratio of potential difference?
5. When is the parallel combination of cells advantageous and why?
6. What is the temperature coefficient of resistivity? What are its units?
7. State Mosley's Law. What is its importance?
8. The half – life period of a radioactive substance is 20 days. What is the time taken for $\frac{7}{8}$ th of its original mass to disintegrate ?
9. Give two important characteristics of nuclear forces.
10. Define Modulation. Why it is necessary ?

SECTION – B

Note : i) Answer any **six** questions. $6 \times 4 = 24$

ii) Every correct answer carries 4 marks.

iii) All are Short answer type questions.

11. Explain the double refraction of light.
12. Derive the equation for the couple acting on a bar magnet in a uniform magnetic field and hence deduce the definition of magnetic moment.

13. Define the capacity of a conductor and explain the principle of a capacitor.

14. Applying the Kirchhoff's laws to wheatstones Bridge and derive the condition of a Wheastone Bridge.

15. Explain neutral and inversion temperatures with the help of the graph between thermo emf and the temperature of the hot junction.

16. Two conductors each of length 12 m lie parallel to each other in air. The distance between the two conductors is $5\times10^{-2}\,\mathrm{m}$ and the current in each conductor is 300 A. Determine the force in newtons tending to pull the conductors together.

17. What is photoelectric cell ? Mention its uses.

18. Write a short note of the discovery of a neutron.

SECTION – C

Note : i) Answer any **two** of the following questions. $2\times8=16$

ii) Every correct answer carries 8 marks.

iii) All are Long answer type questions.

19. What are Harmonics and Overtones ? Derive the equations for the frequencies of the Harmonics and overtones produced in an open pipe.

An open pipe and a closed pipe are in resonance with each other with their first overtones. Find the ratio of their lengths.

20. Obtain an expression for the torque on a loop placed in a uniform magnetic field. Describe the construction and working of a moving coil galvanometer.

21. What is rectifier ? Explain the working of a half wave rectifier with a neat diagram. Mention the expression for its efficiency.

In a hall wave rectifier, a p – n junction diode with internal resistance 20Ω is used. If the load resistance of $2\mathrm{K}\Omega$ is used in the circuit, then find the efficiency of a half wave rectifier.