**Reg. No. : ……..**

**Name : ……..**

# SECOND YEAR HIGHER SECONDARY EXAMINATION

**Part – III** **Time : 2 hours**

**PHYSICS** **Cool-off time: 15 Minutes**

**Maximum: 60 Scores**

**A. Answer any 5 questions from 1 to 7. Each carries 1 score.** **(5 x 1 = 5)**

1. Electric Flux is a scalar quantity. State true or false
2. Which of the following materials have negative magnetic susceptibility?
   a) Aluminium b) Nickel c) Bismuth c) Chromium
3. What is the critical angle of a material medium of refractive index $\sqrt{2}$
4. The electromagnetic wave with shortest wavelength among the following is
   a) UV – rays b) Radio waves c) Micro waves d) X – rays
5. Reason for colour of thin oil film is ----------
6. A convex lens of focal length 20 cm and a concave lens of focal length 25 cm are placed in contact. What is the effective power of the combination.?
7. Two spherical nuclei have mass numbers 216 and 64. What is the ratio of their nuclear radii?

B. **Answer any 5 questions from 8 to 14. Each carries 2 scores.** **(5 x 2 = 10)**

8. Derive the relation connecting electric field and electric potential
9. Define the term capacitance. Write its SI unit
10. State Ohms law. Is it a universal law? Explain
11. Which are the energy losses in a transformer
12. State Faradays laws of electromagnetic induction
13. An electromagnetic wave of frequency 40MHz travels in free space. Determine its wavelength.
14. Define the terms mass defect and binding energy of a nucleus.

C. **Answer any 6 questions from 15 to 21. Each carries 3 scores.** **(6 x 3 = 18)**

15. State Biot- Savarts law and obtain expression for magnetic field at the centre of a circular current carrying coil.
16. Derive an expression for the self-inductance of a solenoid
17. Angle of minimum deviation of an equilateral prism is 30°. Calculate the speed of light through the prism.

18. Obtain an expression for the torque experienced by an electric dipole placed in an external uniform electric field.
19. a) Write Einstein's photo electric equation
    b) The work function for a certain metal is 4.2 eV. Will photo electric emission take place if radiation of wavelength 330 nm incident on this metal surface?
20. With a neat circuit diagram explain the working of a full wave rectifier.
21. The ground state energy of hydrogen atom is -13.6 eV. What are the kinetic and potential energies of the electron in this state?

D. **Answer any 3 questions from 22 to 25. Each carries 4 scores. (3 x 4 = 12)**

22. a) Derive an expression for the capacitance of a parallel plate capacitor
    c) How the capacitance of a parallel plate capacitor will be affected if the medium between the plates is filled with a dielectric?
23. a) Define internal resistance of a cell
    b) A storage battery of emf 8.0 V and internal resistance 0.5 Ω is being charged by a 120 V dc supply using a series resistor of 15.5 Ω. What is the terminal voltage of the battery during charging? What is the purpose of having a series resistor in the charging circuit?
24. Distinguish between para, ferro and diamagnetic materials.Write one example for each.
25. State Huygens's principle. Using Huygens's principle, prove the Snell's law of refraction.

E. **Answer any 4 questions from 26 to 29. Each carries 5 scores. (3 x 5 = 15)**

26. a) State Gauss's theorem
    b) Using Gauss's theorem, derive an expression for electric field due to an infinite plane sheet of charge.
    c) Plot a graph showing the variation electric field due to a spherical shell of charge with distance starting from the centre of the shell.
27. a) Derive an expression for force experienced by a current carrying conductor in an external uniform magnetic field.
    b) Two long and parallel straight wires A and B carrying currents of 8.0 A and 5.0 A in the same direction are separated by a distance of 4.0 cm. Estimate the force on a 10 cm section of wire
28. a) Show that when an alternating voltage is applied across an inductor, the current through the inductor lags behind the voltage by a phase angle $\frac{\pi}{2}$
    b) A pure inductor of 25.0 mH is connected to a source of 220 V. Calculate the inductive reactance

29. a) Derive a relation connecting focal length, radii of curvature, refractive index of the lens and refractive index of the medium in case of a thin lens.
    b) Double convex lenses are to manufactured from a glass of refractive index 1.55 with both faces of the same radius of curvature. What is the radius of curvature required if te focal length of the lens is to be 20 cm.