Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 11

PIT M.Sc (Physics) (Sem.-3)

PLASMA PHYSICS

Subject Code : PHS-532

Paper ID : [51125]

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SEVEN questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

a. What is plasma?

b. Convert 300 °K and 10^5 °K into eV.

c. Define plasma parameter.

d. Write a short note on optical diagnostics of plasma.

e. List any four applications of plasma.

f. Explain how plasma can be supported against gravity.

g. Define adiabatic invariant. List any two of them.

h. Compute Larmor radius for a 10-keV electron in the earth's magnetic field of 5×10^{-5} T ($V_{\parallel}$ is negligible).

i. Define magneto-sonic plasma waves.

j. Explain Paschen's law.

SECTION-B

2. What is meant by plasma oscillations? Derive expression for electron plasma frequency.

3. Describe any five factors that affect breakdown voltage of a vacuum gap.

4. Describe different regions inside a glow discharge tube and hence, derive expression for number of electrons striking anode per second.

5. Describe motion of a charge particle inside a magnetic mirror.

6. What are Alfven waves? Derive expression for Alfven velocity.

7. Write expression for Vlasov equation explaining each term. What is origin of this equation?

8. Derive expression for motion of a charged particle in crossed electric and magnetic fields.

SECTION-C

9. Explain working of a collecting Langmuir probe along with its l-V characteristic. How can the characteristic be used to estimate electron temperature?

10. Write down magneto-hydrodynamic (MHD) equations for conservation of particles and equation of motion for positive ions and electrons. Explain the terms used.

11. Explain breakdown of a gas in a discharge tube. Derive expression for Townsend criterion for spark breakdown.