

Date: 13-03-2014
Thursday

V.P. & R.P.T.P. SCIENCE COLLEGE

B. Sc. SEMESTER VI

PHYSICS

Internal Test

US06CPHY04

Total Marks: 30

Time: 3.30 to 05.00p.m.

- Note: i) Number to the right indicate marks.
ii) Draw the diagram where it is necessary
iii) Notations have their usual meanings

- Q1 Answer the following questions in short – (any three) 6
- i) What do you mean by atomic polarizability? What is the atomic polarizability of H?
- ii) What is separation variables? When one can make use of it?
- iii) Mention the three conditions a plasma must satisfy.
- iv) Explain that “plasmas are diamagnetic”.
- v) Which phenomenon is called “Langmuir's paradox”?
- vi) Discuss the plasma approximation.
- Q2a) In what case the Poisson's equation reduces to Laplace's equation. By giving a suitable illustration explain the Laplace's equation in two dimensions. 4
- b) Discuss Physical interpretation of bound charges 4
- OR**
- Q2a) Explain Gauss's law in the presence of Dielectrics. What is electric displacement **D**? 4
- b) Explain in detail the basic properties of conductors 4
- Q3a) Obtain the expression for the Debye length λ_D . Draw potential distribution near a grid in a plasma. 4
- b) Write a note on single particle moving in uniform magnetic field (B) obtain the expression for Larmor radius. 4
- OR**
- Q3a) Mention the applications of plasma physics. Discuss in detail any three of them. 4
- b) Show that the Grad-B drift is given as $V_{\nabla B} = \pm \frac{1}{2} v_{\perp} r_{\perp} \frac{B \times \nabla B}{B^2}$ 4
- Q4a) Discuss “fluid drifts parallel to B” 4
- b) For ion wave derive the speed of sound in plasma 4
- OR**
- Q4 Define plasma. What is plasma frequency? What are the assumptions made to derive an expression for the plasma frequency ω_p in the simplest case. Show that the plasma frequency is given by $\omega_p = \left(\frac{4\pi n_0 e^2}{m} \right)^{1/2}$ rad/sec 8

