

Course Code: 4MSCP3
Course: Plasma Physics
Credit: 3
Last Submission Date: October 31 (for January Session)
April 30, (for July session)

Max. Marks:-30

Min. Marks:-11

Note:-attempt all questions.

- Que.1 Plasma is called fourth state of matter- why? Explain occurrence of plasma in nature.
- Que.2 Give validity of plasma approximation?
- Que.3 Consider Alfvén waves propagating in a uniform plasma in a uniform field with the wave vector \mathbf{K} parallel to the applied magnetic field \mathbf{B}_0 .
- Que.4 Explain diffusion in weakly and fully ionized plasma.
- Que.5 Starting from the vlasov equation show that the Landau damping decrement for weakly damped electron plasma waves in the low frequency range is given by

$$\text{Im}(\mathcal{W}) = -\sqrt{\pi}/8 \frac{\omega p_e}{k^3 \lambda_D^3} \exp\left[-\frac{1}{2k^2 \lambda_D^2}\right]$$

Where the symbols have their usual significance. Give the physical mechanism of Landau damping.

- Que.6 Derive fluid equations?
- Que.7 What is magnetic confinement? Explain its pinch effect.
- Que.8 Briefly discuss about plasma heating.
- Que.9 Write short notes on :- (Any two)
- (i) Plasma Oscillations
 - (ii) Weibel instability
 - (iii) Plasma echoes