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**National Institute of Technology, Hamirpur (HP)**

End Semester Examination - November, 2023

Course - B.Tech. Engineering Physics

Semester - 5<sup>th</sup>

Subject Code - PH-312

Subject Name - Plasma Physics

Maximum Marks: 50

Time: 3 Hours

All questions are compulsory.

- Q 1:
- Write magnetic moment associated with circulating current. (1)
  - Define cut off frequency. (1)
  - What is the physical significance of phase velocity? (1)
  - Is in any case phase velocity is greater than speed of light in vacuum? (1)
  - Write magnetic flux through orbit of gyrating particle. (1)
  - How weakly ionized plasma is different from strongly ionized plasma? (1)
  - Define cyclotron frequency. (1)
  - MHD equation can be used to describe..... (1)
  - Which type of waves cannot propagate in unmagnetized plasma..... (1)
  - For plasma cut off refractive index is equal to..... (1)

Q 2: Discuss the behavior of transverse electromagnetic waves in cold field free plasma. (5)

Q 3: How the magnetic flux varies through any open surface moving with highly conducting plasma fluid? (5)

Q 4: Calculate the electron diamagnetic drift as function of  $x$ , for isothermal plasma confined between the planes  $x = \pm d$  in magnetic field  $\vec{B} = B\hat{k}$  with a density distribution  $n(x) = n_0 \left(1 - \frac{x^2}{d^2}\right)$ . (5)

Q 5: Which type of trajectories are followed by charge particle in the uniform magnetostatic field? (5)

Q 6: How fluid drifts are different from the drifts experience by the individual particles? (5)

Q 7: Discuss the effect of plasma frequency variation on electron plasma waves in warm plasma? (5)

Q 8: What are the condition that makes plasma different from the ordinary ionized gas? (5)

Q 9: What are different applications of Plasma? Discuss one of the application. (5)