Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – Reg./Supple./Improv.)
Examination, April 2019
(2014 Admission Onwards)
CORE COURSE IN PHYSICS
6B15PHY : (Elective – A) : Plasma Physics

Time : 3 Hours

Max. Marks : 40

Instruction : Write answers in **English** only.

SECTION – A

Answer **all** – Very Short Answer Type – **Each** question carries **one** mark.

1. A 1 ev plasma corresponds to a temperature of _____

2. The minimum energy required to detach an electron from an atom is known as _____

3. Life time of an excited state is about _____

4. For an isotropic Maxwellian fluid, the stress tensor P is _____

SECTION – B

Answer **any seven** – Short Answer Type – **Each** question carries **two** marks.

5. What are the main sources of errors in probe measurement for plasma diagnostic techniques ?

6. What do you mean by van Allen belts ?

7. Write down the different methods to supply minimum energy required to ionize an atom.

8. What is Langmuir paradox ?

9. Write down Maxwell's equations.

10. What is curvature drift ?

P.T.O.

11. Plasma is diamagnetic in nature. Comment on it.

12. What do you mean by mobility ? Derive an expression for it.

13. Write down the equations of motion and continuity for an ion wave.

14. Distinguish between group velocity and phase velocity.

SECTION – C

Answer **any four** – Short Essay/Problem Type – **Each** question carries **three** marks.

15. What is meant by Debye length ? Derive an expression for it.

16. Briefly explain the single probe method with proper diagram.

17. Write a short note on magnetic mirrors.

18. Prove that $\frac{\partial n}{\partial t} + \nabla . (n u) = 0$.

19. Derive an expression for plasma frequency.

20. Show that magnetic flux through a Lamor orbit is conserved.

SECTION – D

Answer **any two** – Long Essay Type – **Each** question carries **five** marks.

21. Explain Townsend theory for coalitional ionization, also derive an expression for the breakdown potential.

22. Show that in the electron plasma waves the phase velocity is always greater than or equal to $\sqrt{\frac{3}{2}}$ v_{th} whereas the group velocity is always less than or equal to $\sqrt{\frac{3}{2}}$ v_{th}, where v_{th} is the thermal velocity.

23. Derive an expression for fluid drift perpendicular to the magnetic field $\vec{B}$.

24. Derive expression for cyclotron frequency and Lamor radius for a charged particle moving in a uniform magnetic field.

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