3.	An Introduction to dynamics Meteorology by James R. Hotton, Wiley	1986
4.	A first course in Atmospheric Thermodynamics by Petty G.W. , Cambridge University press.	1998

1. Subject Code: **EP-425** Course Title: **Plasma Science and Technology-I**
2. Contact Hours : L : 3 T : 1 P : 0
3. Examination Duration (Hrs.) : Theory : 3 Practical : 0
4. Relative Weight : CWS : 25 PRS : 15 MTE : 25 ETE : 50 PRE : 0
5. Credits : 4
6. Semester : ODD
7. Subject Area : DEC-6
8. Pre-requisite : Understanding of Classical physics, electromagnetic theory including Maxwell's equations, and mathematical familiarity with partial differential equations and complex analysis
9. Objective : *Acquiring basic knowledge concerning: 1) plasma parameters in technological devices, laboratory and nature; 2) motion of charged particles in magnetic fields, plasma confinement schemes, MHD models, simple equilibrium and stability analysis, 3) two-fluid hydrodynamic plasma models, and wave propagation in a magnetic field.
10. Details of Course :

S.No.	Contents	Contact Hours
1.	**Introduction to Plasmas** Plasma as a fourth state of matter, an ionized gas, particle interactions and collective effects, occurrence of plasma in nature, Applications of plasma. Characteristics of plasmas/criteria for definition of plasma: quasi-neutrality, Debye shielding, plasma parameter, Plasma oscillations and plasma frequency. Fluid and Kinetic approaches to the study of plasma (basic concepts) Boltzmann and Fokker Planck Equations: Transport Phenomena.	8
2.	**Methods of Plasma Production and Plasma Diagnostics** DC discharge, RF discharge, photo-ionization, microwave plasma production, tunnel ionization, laser avalanche breakdown of gases, laser ablation, plasma measurements (density, temperature), Langmuir probes, neutral and ion beam probes, particle defects and velocity analyzer, Microwave diagnostics.	8
3.	**Motion of charged particle in Uniform and Non uniform E and B Fields** Single particle motion in uniform E and B Fields: uniform **B** field, **E** = 0, uniform **B** and non zero **E**, guiding centre drift, $\mathbf{E}\times\mathbf{B}$ drift, drift due to gravity or other forces. Single particle motion in non-uniform B field: grad **B drift,** curvature **B** drift, adiabatic invariant.	8
4.	**Fluid description of Plasmas** Maxwell's equations, pressure gradient force, rate of collisional loss of momentum and energy, fluid equations: equation of continuity, equation of motion, equation of energy balance, electron and ion response to dc and ac electric fields: DC conductivity, AC conductivity and MHD power generation.	8
5.	**Computational Methods in Plasma Physics** Analysis of methods for the	

	numerical solution of the partial differential equations of plasma physics, including those of elliptic, parabolic, hyperbolic, and eigen value type. Topics include finite difference, finite element, spectral, particle-in-cell(PIC), Monte Carlo, moving grid, and multiple-time-scale techniques, applied to the problems of plasma equilibrium, transport, and stability.	10
	Total	**42**

11.Suggested Books

S.No.	Name of Books/ Authors	Year of Publication/ Reprint
1.	Introduction to plasma physics and controlled fusion, F.F. Chen /Springer scie	1983
2.	Principles of plasma physics, N. Krall and A.W. Trivelpiece /San Francisco Press	1986
3.	Classical Electrodynamics, J.D. Jackson NewYork	3rd Edition
4.	Interaction of electromagnetic waves with electron beams and plasmas, C.S. Liu and V.K. Tripathi/World Scientific	1994
5.	Computational plasma physics: With Applications to fusion and Astrophysics, Toshiki Tajima/Westview Press	2004
6.	Plasma Physics via Computer Simulation, C.K. Birdsall, A. B. Langdon/IOP Publishing Ltd	1991