

ANDHRA UNIVERSITY
DEPARTMENT OF PHYSICS
M.Sc. SPACE PHYSICS
IV SEMESTER
(w.e.f. 2009-2010 admitted batch)

SPS-5425

SP 402 IONOSPHERIC PLASMA DYNAMICS

UNIT – I: FUNDAMENTALS OF IONOSPHERIC PLASMA DYNAMICS

(Chs. 1.4 in Holton, 1 & 4 in Rishbeth and Garriott, 2 in Kelly and Heelis)

Fundamental forces – Pressure gradient force and Viscosity force. Apparent forces – Centrifugal force and Coriolis force. Equation of motion of the neutral air. Geostrophic approximation and thermal wind equation.
4 Hrs.

Elements of atmospheric tides, planetary waves and internal gravity waves.

6 Hrs.

Steady state ionospheric plasma motions due to applied forces. Electrical conductivity of the ionosphere. Generation of electric fields and electric field mapping.
6 Hrs.

UNIT – II: EQUATORIAL ELECTRODYNAMICS

(Chs. 3 and 4 in Kelly & Heelis)

Motions in the equatorial ionosphere

F region – Motions of equatorial F region. Equatorial F region dynamo. E region – E region dynamo and Equatorial Electro Jet (EEJ). Feedback between electrodynamics and thermospheric winds.
10 Hrs.

UNIT – III: Equatorial plasma instabilities

F region plasma instabilities – Development of instabilities. Development and initiation of equatorial spread F. Linear theory of GRT instability.
6 Hrs.

E region plasma instabilities and linear theory of EEJ instabilities.

4 Hrs.

UNIT – IV: ELECTRODYNAMICS AND MID-LATITUDE IONOSPHERE

(Ch. 5 in Kelly and Heelis)

Competing influences on tropical and mid latitude ionospheres. Equatorial anomaly. Electrodynamics of tropical and mid latitude zone. Night time tropical ionosphere. E region in mid latitude zone.
8 Hrs.

Irregularities in mid latitude ionosphere. Mid latitude plasma instabilities and F region plasma instabilities in the equatorial anomaly region. Midlatitude E region instabilities.
6 Hrs.

- BOOKS:** 1. "Introduction to dynamic meteorology" by J.R.Holton.
2. "Introduction to ionospheric physics" by H.Rishbeth and O.K.Garriott.
3. "The earth's ionosphere (plasma physics and electro dynamics)" by M.C.Kelly and R.A.Heelis.

MCM

Head

Department of Physics
A.U. College of Science & Tech.
VISAKHAPATNAM - 530 003

A.V. Rao

CHAIRMAN

P G Board of Studies (Physics)
DEPT. OF PHYSICS
JVD College of Science & Technology
Andhra University
VISAKHAPATNAM-530 003