Fourth year of Five Years integrated M.Sc (Physics)	**L**	**T**	**P**	**C**
M.Sc. – IV, Semester – VIII				
MP 452 : Introduction to Atmosphere and Its Dynamics	**3**	**0**	**0**	**3**

- **BASIC CONCEPTS OF EARTH'S ATMOSPHERE** **(08 Hours)**
  Atmosphere nomenclature, Hydrostatic equations scale height, Geopotential height, Chemical concepts of atmosphere, Thermodynamic considerations, elementary chemical kinetics composition and chemistry of middle atmosphere and thermosphere. Thermal balance in the atmosphere, models of neutral atmosphere (CIRA, US Standard atmosphere, Sasi Model)

- **ATMOSPHERIC THERMODYNAMICS** **(08 Hours)**
  Laws of thermodynamics, Lapse rate, thermodynamic equations entropy change water-air mixture, moisture variables, potential temperature, virtual temperature, thermodynamic diagram, dry and moist static energy, static stability, convective instability.

- **INTERACTION OF SOLAR RADIATION WITH THE ATMOSPHERE** **(12 Hours)**
  Temperature of the sun and spectral distribution of solar radiation, blackbody radiation budget of radiation energy, Passage of solar radiation through the atmosphere, atmospheric windows, emissivity, absorption spectra of atmospheric gases, optically thick and thin approximation, aerosol, scattering, calculation of radiative heating and coling, terrestrial radiation and its passage through the atmosphere
  Solar radiation at the top of the atmosphere, Attenuation of solar radiation in the atmosphere, radiative transfer, thermal effect of radiation, photochemical effects of radiation, Airglow

- **DYNAMICS OF EARTH'S ATMOSPHERE** **(06 Hours)**
  Equation of motion of neutral atmosphere, Thermal wind equation, elementary ideas of planetary waves, internal gravity waves and atmospheric tides.

- **BASIC EQUATIONS OF ATMOSPHERIC DYNAMICS** **(08 Hours)**
  Equations of motion in spherical coordinates, rotating frame, coriolis force, quasistatic approximation, scale analysis, Rossby number, balanced flow, natural coordinate system, equations of continuity in spherical and Cartesian coordinates. Thermodynamic energy equations, pressure as vertical coordinate

(Total Contact Time (Theory) : 42 Hours)

BOOKS RECOMMENDED :

1.	**Andrews David G.**	*An Introduction to Atmospheric Physics*	Cambridge Uni. Press	2000
2.	**Houghton H. G.**	*Physical Meteorology*	M I T Press	1985
3.	**Riegel C. A.**	*Fundamentals of Atmospheric Dynamics and Thermodynamics*	World Scientific	1992
4.	**Bohren Craig F. and Albrecht B.A.**	*Atmospheric Thermodynamics*	Oxford Uni. Press	1998
5.	**Hess S. L.**	*Introduction to Theoretical Meteorology*	Krieger Pub. Co.	1979