M. Sc. II Year	MPH-E404	Semester-IV
ELECTIVE PAPER III	ELECTRCAL ATMOSPHERE & MODELING	

Total Lectures	Time Allotted for End Semester Examination	Marks Allotted for Continuous Assessment	Marks Allotted for End Semester Examination (ESE)	Maximum Marks (MM)	Total Credits
60	**4 Hrs**	**30**	**70**	**100**	**04**

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllbus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT-I

ATMOSPHERIC ELECTRICITY

Fair-weather atmospheric electric fields and currents, Mechanisms of cloud electrification: precipitation powdered & connective mechanisms, electrochemical charge separation, charge structure of the clouds, thundercloud electric fields.

(12 Lectures)

UNIT-II

PHYSICS OF LIGHTNING

Lightning initiation in a thundercloud, Cloud to ground and intra-cloud lightning, Positive lightning, Lightning super bolts, Lightning fields: electric & magnetic fields, Radiations from lightning, Application of the lightning electric field measurements. Lightning sprites.

(12 Lectures)

UNIT-III

ATMOSPHERIC OZONE

Ozone and the Dobson unit, Temporal and spatial variation of ozone Umkehr effect,Stratospheric ozone, Ozone flux from stratospherie to the troposphere, Troposphric ozone, Chapman mechanism, Ozone depletion on ozone Hole, Polar stratospheric clouds and Role of ozone.

(12 Lectures)

UNIT-IV

NUMERICAL METHODS

Solution to atmospheric equations: Approximate solutions, Parameterizations & models. Grid points. Finite difference equations, Numerical stability: Numerical forecast process: Balanced mass & flow fields, Data assimilation & analysis.

(12 Lectures)

UNIT-V

WHETHER PREDICTION

Forecasting, Post processing, Refinements, Forecast quqlity; accuracy & verification, Elementary non linear dynamics & chaos: Predictability, Lorentz strange attractor. Ensemble forecaster.

(12 Lectures)

Text Books / Reference Books

1. Atmospheric Science: John M.Wallace & Peter V. Hobbs, Academic Press(2006)
2.Meteorology for Scientists and Engineers-Ronaid B. Stul,Brocks/Cole Cengage Learning(1995)
3. 4.Dynamic Meteorology: Holton, J.R, 3rd edition Academic Press N.Y.(1992)
5. The Physics of Monsoons_ R.N.keshavamurthy and m.Shanker Rao, Allied publishers, 1992.
6.Numerical weather prediction_G.J.Haltiner and R.T.Villians John wiley and sons 1980.
7.Atmospheric chemistry and Physics-J.H. Seinfield and spynes N. Pandis, wiley and sons,2006