

BHARATHIAR UNIVERSITY

PROPOSED SYLLABUS

M PHIL : PART I METEOROLOGY

PAPER I : RESEARCH METHODOLOGY

(COMMON TO ALL)

Unit I: Research – Scope and Characteristics

Meaning and function of research; Identification of the research problem; Qualities of a research worker; Guidance in research; Investigation; Results and discussions; Attending a scientific seminar/conference; Relevant reference material.

Unit II: Statistical Methods

Central tendency and dispersion; Theoretical distributions: Binomial, Poisson and Normal distributions; Test of Hypothesis: T – test and Chi square test; Curve fitting; Correlation and regression.

Unit III: Analysis of Meteorological Charts

Surface: Analysis of weather charts and some typical weather situations over India and neighbourhood; Analysis of derivative charts; Upper air analysis of streamlines, isotachs and contours; Tropical Analysis: Problems of analysis of surface and upper air charts in tropical region; Vertical velocity, divergence, vorticity, calculations thereof by different methods; Jet Stream Analysis: LMW analysis; Assessment of low level systems; Waves: Identification of long and short waves, Measurement of their speeds.

Unit IV : Numerical Analysis & Computer Programming

Solution of Algebraic Equations (Non-linear Equations): Newton–Raphson method, Convergence criteria, Generalized Newton’s method; Solution of systems of non–linear equation by Newton–Raphson method; Numerical solution of partial differential equation: Solution by Taylor’s series, Euler’s method, Modified Euler’s method, Runge-Kutta method: Computer Programming: High level languages and their application, FORTRAN-77, Common application of software like MS Office including MS Excel, MS Access etc.

Unit V: Thesis writing

Assignment and Thesis at the tertiary level: Writing at the tertiary level, Planning the assignment, Planning the thesis, Scholarly writing, Writing thesis or assignment, General format. Page and Chapter format, Use of quotations, Footnotes, Tables and figures, Referencing, Appendices, Revising the Assignment or Thesis. Editing and evaluating the final product.

References

1. Hand Book of Methodology of Research – Rajammal, P Devadas and K Kulandaivel, Sri Ramakrishna Mission Vidyalaya Press, Coimbatore-20 (1976).
2. Higher Mathematics for Engineers and Physicists – II Edition – Mc Graw Hill, 1941, Ivan S Sokolnikoff & Elizabeth S Sokolnikoff
3. Thesis and Assignment writing – Janathan Anderson et al – Wiley Eastern Ltd., 1977.
4. Science of Educational Research, Von Nostrand Rainhold & Co., New York – George J Mowly, Chapter 8 – 12.
5. Statistics – Murray R Spiegel
6. Statistics – Theory, Methods & Application, Sancheti & J Kapoor
7. Applied Statistics in Atmospheric Science – Essenwanger
8. Synoptic Climatology – Barry & Perry
9. Hand Book of Statistical Methods in Meteorology, CEP Brooks DSc, N Carruthers B SCOOP, London, Her Majesty's Stationary Office, London.

PAPER – II: GENERAL METEOROLOGY
(COMMON TO ALL)

Unit I: Dynamic Met

Scale analysis; Equation of motion; Continuity equation; Vorticity equation: Vorticity theorem and its applications; Quasi-Geostrophic theory: Omega equation, Tendency equation; Atmospheric waves: Perturbation theory, Rossby wave, Baroclinic wave; Baroclinic & Barotropic instability; Atmospheric turbulence: Prandtl's layer, Ekman layer; Secondary circulations, Transport of momentum, Heat and water vapour in PBL.

Unit II : Thermodynamics

Equation of state: Work done by an expanding gas, Specific heat, Laws of thermodynamics, Adiabatic processes and concept of potential temperature; Emagram and linear representation of energy integrals: Thermodynamic diagrams and thermodynamics in non-linear system; Adiabatic expansion of saturated air, Reversible ascent and concept of pseudo-wet bulb temperature and potential temperature;

Unit III : Cloud Physics

General aspects of cloud and precipitation processes; Nucleation of liquid water ice in water vapour: Growth processes of droplets, principle and uses of Radar in cloud physics.

Unit IV: Satellite Meteorology

Characteristic features of satellite imageries: Different type of satellite images viz. Visible, IR, Water Vapour, Microwave, Image enhancement techniques, Cloud features associated with jet stream, Western disturbances and tropical cyclones.

Unit V: Climatology

Temperature and wind microclimates: Heat island, Climate variation in wind at different seasons; Synoptic climatology: Theory of climatic changes, Regional and hemispherical models; Applied climatology; Methods of studies in climatological analysis: Fourier Methods and its uses in meteorology.