

BHARATHIAR UNIVERSITY (CBCS PATTERN)**SCHEME OF EXAMINATION****M.SC. METEOROLOGY (CBCS PATTERN)**

WITH COMPULSORY DIPLOMA

For the students admitted during the academic year 2008-2009 Batch onwards

| Study Components / Course Title | Inst. Hours/ Week | Examination | | | | Credit |
|---------------------------------|----------------------|-------------|------|--------------|-------|--------|
| | | Duration | CIA@ | Uni. Exam | Total | |

| Semester I | | | | | | |
|--|----|---|----|-----|------|----|
| GENERAL METEOROLOGY | 5 | 3 | 25 | 75 | 100 | 4 |
| OBSERVATION & INSTRUMENTS | 5 | 3 | 25 | 75 | 100 | 4 |
| SYNOPTIC METEOROLOGY – I | 5 | 3 | 25 | 75 | 100 | 4 |
| PHYSICAL METEOROLOGY – I | 4 | 3 | 25 | 75 | 100 | 4 |
| CLIMATOLOGY & STATISTICS – I | 5 | 3 | 25 | 75 | 100 | 4 |
| PRACTICAL – I : INSTRUMENTS AND OBSERVATIONAL PRACTICES | 3 | | - | - | - | - |
| Elective/Dip. I - AVIATION METEOROLOGY – I | 3 | 3 | 25 | 75 | 100 | 3 |
| Semester II | | | | | | |
| DYNAMIC METEOROLOGY – I | 6 | 3 | 25 | 75 | 100 | 4 |
| SYNOPTIC METEOROLOGY – II | 6 | 3 | 25 | 75 | 100 | 4 |
| SATELLITE METEOROLOGY – I | 6 | 3 | 25 | 75 | 100 | 4 |
| CLIMATOLOGY AND STATISTICS – II | 5 | 3 | 25 | 75 | 100 | 4 |
| PRACTICAL – I : INSTRUMENTS AND OBSERVATIONAL PRACTICES | - | 3 | 40 | 60 | 100 | 4 |
| PRACTICAL - II : APPLIED METEOROLOGY & LAB PRACTICES | 4 | 3 | 40 | 60 | 100 | 5 |
| Elective/Dip. II – AVIATION METEOROLOGY II | 3 | 3 | 25 | 75 | 100 | 3 |
| Semester III | | | | | | |
| DYNAMIC METEOROLOGY – II | 5 | | 25 | 75 | 100 | 5 |
| SATELLITE METEOROLOGY – II | 5 | | 25 | 75 | 100 | 5 |
| PHYSICAL METEOROLOGY – II | 5 | | 25 | 75 | 100 | 5 |
| NUMERICAL WEATHER PREDICTION | 6 | | 25 | 75 | 100 | 5 |
| PRACTICAL - III : ANALYSIS AND PROGNOSIS | 6 | - | - | - | - | - |
| Elective/Dip. III – AVIATION METEOROLOGY – III | 3 | | 25 | 75 | 100 | 3 |
| Semester IV | | | | | | |
| PRACTICAL – III – ANALYSIS AND PROGNOSIS | 6 | | 40 | 60 | 100 | 5 |
| PROJECT WORK | 18 | | 40 | 160 | 200 | 8 |
| Elective/Dip. IV – PRACTICAL – I | 3 | | 20 | 30 | 50 | 3 |
| Elective/Dip. IV – PRACTICAL – II | 3 | | 20 | 30 | 50 | |
| Total | | | | | 2200 | 90 |

Electives/Diplomas : **List of Group Elective/Diploma papers (Colleges can choose any one of the Group/Diploma papers as electives)**

| | GROUP A Diploma in - AVIATION METEOROLOGY | GROUP B Diploma in DIPLOMA IN CLIMATOLOGY | GROUP C Diploma in DIPLOMA IN WEATHER FORECASTING TECHNIQUES |
|-----------------------|---|---|---|
| Paper I/ Sem I | AVIATION METEOROLOGY – I | ELEMENTS OF CLIMATE | SYNOPTIC TECHNIQUES AND THERMODYNAMIC DIAGRAMS |
| Paper II/ Sem II | AVIATION METEOROLOGY II | REGIONAL CLIMATOLOGY | SATELLITE AND RADAR TECHNIQUES |
| Paper III/ Sem III | AVIATION METEOROLOGY – III | APPLICATION OF STATISTICS IN CLIMATOLOGY | STATISTICAL AND NWP TECHNIQUES |
| Paper IV/ Sem IV | PRACTICAL – I PRACTICAL – II | PRACTICAL – I PRACTICAL – II | PRACTICAL – I PRACTICAL – II |

- Notes: 1. The syllabus for the above papers (except Compulsory Diploma B & C) be the same as prescribed for the academic year 2007-08.
2. The syllabus for Compulsory Diplomas B & C are furnished below:

M.Sc METEOROLOGY
DIPLOMA IN CLIMATOLOGY
SEMESTER I - PAPER I
ELEMENTS OF CLIMATE

UNIT I

Air Temperature

Source of atmospheric heat, Major factors determining the amount of Solar Radiation, Earth & Sun relations, Distribution of Solar Radiation over the Earth. Assumption of Insolation at earth's surface, Heat balance of the earth.

UNIT II

Atmospheric Pressure and Winds

Importance of Pressure & Wind as climatic elements & climatic controls, Types and causes of Pressure changes & differences, Relation of Winds to Pressure, Distribution of Zonal component of mean Surface Winds, Winds at Tropics, Subtropics & Polar region, General circulation of the atmosphere.

UNIT III

Atmospheric Moisture and Precipitation

Importance of Water Vapour, Measurement & distribution of Humidity, Condensation- Different forms and theory. Fog – Classification of Fogs, Stable & Unstable atmospheric conditions, Their relation to Precipitation, Distribution of Precipitation.

UNIT IV

Air Masses and Fronts

Origin & Nature of Air Masses, Classification of Air Masses, Modifications of Air Masses, World pattern of Frontal Zones & air Masses, Air Masses of Asia.

UNIT V

Atmospheric Disturbances and their associated types

Atmospheric Disturbances as Generators of Precipitations, Storms as climatic phenomena. Middle Latitude Cyclones & Anticyclones, Precipitations in Cyclones & Anticyclones.

References :

1. Training Notes – Dept of Met- Vol III
2. Climate of South Asia – GB Pant & K Rupa Kumar
3. Concepts in climatology – PR Crowe

4. General Climatology – Critchfield.
5. International Geophysics Series–Vol28 Urban Climate–Helmut E Landsberg
6. WMO compendium on climatology.
6. Statistical - Schaum Series.
7. Statistical Methods - SP Gupta.
8. Statistical methods in the Atmospheric Sciences – Wilks Daniel S.

M.Sc METEOROLOGY

DIPLOMA IN CLIMATOLOGY

SEMESTER II - PAPER II

REGIONAL CLIMATOLOGY

UNIT I

Classifications of Climates and the World pattern

Composite Climate of an Earth Region, Climatic elements and Weather Types, Classification of Climates, Climatic Regions and Climatic Types, Systems of Climatic Classifications Koppen's Classification & Thornthwaite's Classification.

UNIT II

Climatology of Pakistan

Distribution of Pressure, Temperature, Rainfall, Upper Winds and Temperature.

UNIT III

Climatology of China

Distribution of Pressure, Temperature, Rainfall, Upper Winds and Temperature.

UNIT IV

Climatology of Maldives

Distribution of Pressure, Temperature, Rainfall, Upper Winds and Temperature.

UNIT V

Climatology of Myanmar, Thailand and Bangladesh

Distribution of Pressure, Temperature, Rainfall, Upper Winds and Temperature.

References :

1. Training Notes – Dept of Met- Vol III
4. Climate of South Asia – GB Pant & K Rupa Kumar
5. Concepts in climatology – PR Crowe
7. General Climatology – Critchfield.
8. International Geophysics Series–Vol28 Urban Climate–Helmut E Landsberg
9. WMO compendium on climatology.

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M.Sc METEOROLOGY

DIPLOMA IN CLIMATOLOGY

SEMESTER III - PAPER III

APPLICATION OF STATISTICS IN CLIMATOLOGY

UNIT I

Theory of Probability

Definition, Events, Addition and Multiplication Laws of Probability.
Conditional Probability : Bayes Theorem
Mathematical Estimation

UNIT II

Theoretical Distribution

Binomial Distribution
Poisson Distribution
Normal Distribution: Standard Normal Distribution

UNIT III

Correlation Analysis

Introduction, Types, Methods of Study, Karl Pearson's, Co-efficient of Correlation, Merits and Limitations, Co-efficient of Determination, Probable Errors.

UNIT IV

Regression analysis

Introduction, Difference between Regression and Correlation Analysis, Regression Lines.

UNIT V

Climatology of India

Distribution of Pressure, Temperature, Rainfall, Upper Winds and Temperature.

References :

1. Training Notes – Dept of Met- Vol III
6. Climate of South Asia – GB Pant & K Rupa Kumar
7. Concepts in climatology – PR Crowe
10. General Climatology – Critchfield.
11. International Geophysics Series–Vol28 Urban Climate–Helmut E Landsberg

12. WMO compendium on climatology.
6. Statistical - Schaum Series.
7. Statistical Methods - SP Gupta.
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M.Sc METEOROLOGY
DIPLOMA IN CLIMATOLOGY
SEMESTER IV - PAPER IV
PRACTICAL- I

UNIT I

Using Statistical Techniques making normals for Pressure, Temperature & humidity of particular place.

UNIT II

Finding the Distribution pattern of Temperature, Humidity and Pressure of a particular place.

UNIT III

Deriving a multiple Linear Regression equation for Thunder Storm of a particular place.

UNIT IV

Exercise on Predictors selection for Thunder Storm using Screening Regression.

UNIT V

Exercise on Predictors selection for Precipitation using Forward selection.

M.Sc METEOROLOGY
DIPLOMA IN CLIMATOLOGY
SEMESTER IV - PAPER IV
PRACTICAL- II

UNIT I

Studying the Monthly Normals of Indian region.

UNIT II

Studying the Monthly Normals of Pakistan.

UNIT III

Studying the Monthly Normals of China.

UNIT IV

Drawing inferences and Forecasting hints from the Statistical normals of a Indian region

UNIT V

Forecasting of simultaneous occurrence of Rain using Classical Statistical Methods.

M.Sc METEOROLOGY

DIPLOMA IN WEATHER FORECASTING TECHNIQUES

SEMESTER I **PAPER I**

SYNOPTIC TECHNIQUES AND THERMODYNAMIC DIAGRAMS

UNIT I

Surface and Upper air Analysis

Introduction, Methodology – Analysing elements like pressure, temperature, dew point, derivative features.

Analysis of Upper air Charts – Streamlines and Isotach analysis, basic principles, rules for analysis.

UNIT II

Analysis of Auxiliary Charts

Constant pressure Charts, Computation of winds, Thickness between Isobaric layers, Advection charts, Time differential charts, Continuity charts and Vertical wind change.

UNIT III

Computation of Derived Quantities and Vertical Time Section

Analysis of Tephigram, Identification of Isobaric layers and Stable layers, Stability Indices, Determination of LCL, MCL, FL and RH.

UNIT IV

Synoptic Systems during different Seasons

Formation, Structure, Movement, Life cycle, Forecasting of their weakening, Strengthening and their Movement.

UNIT V

Forecasting of Mid Latitude Systems affecting Indian region

Formation, Structure, Movement, Life cycle, Forecasting of their weakening, Strengthening and their Movement.

References :

1. Training Notes – Dept of Met- Vol III
8. Climate of South Asia – GB Pant & K Rupa Kumar

9. Concepts in climatology – PR Crowe
13. General Climatology – Critchfield.
14. International Geophysics Series–Vol28 Urban Climate–Helmut E Landsberg
15. WMO compendium on climatology.
6. Statistical - Schaum Series.
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M.Sc METEOROLOGY

DIPLOMA IN WEATHER FORECASTING TECHNIQUES

SEMESTER II **PAPER II**

SATELLITE AND RADAR TECHNIQUES

UNIT I

Introduction to Weather Satellite

History of Met Satellite, Orbits and Platforms, Fundamental ideas on Remote Sensing.

UNIT II

Introduction to Visible, IR and WV imageries

Basic principles of interpretation of Visible, IR and WV imageries.
Problems areas in interpreting Visible, IR and WV imageries
Fundamentals of Image characteristics.
Identification of Fog, Dust Haze and other obscurities.

UNIT III

Tropical and Extra Tropical Systems

Monsoon Depression, WD over Indian region, Easterly waves, STJ

UNIT IV

Mesoscale Convective Storms

Mobile Squall lines, Slow Moving Squall lines, Mesoscale Convective Complexes..

UNIT V

RADAR

Basic Principles, Uses and Limitations, Doppler weather Radar Products. Uses of Radar in Nowcasting.

References :

1. Training Notes – Dept of Met- Vol III
10. Climate of South Asia – GB Pant & K Rupa Kumar
11. Concepts in climatology – PR Crowe
16. General Climatology – Critchfield.

17. International Geophysics Series–Vol28 Urban Climate–Helmut E Landsberg
18. WMO compendium on climatology.
6. Statistical - Schaum Series.
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M.Sc METEOROLOGY

DIPLOMA IN WEATHER FORECASTING TECHNIQUES

SEMESTER III
PAPER III

STATISTICAL AND NWP TECHNIQUES

UNIT I

Theory of Probability - 1

Definition, Events, Addition and Multiplication Laws of Probability.
Conditional Probability: Bayes Theorem
Mathematical Estimation

UNIT II

Theoretical Distribution

Binomial Distribution
Poisson Distribution
Normal Distribution : Standard Normal Distribution

UNIT III

Correlation and Regression Analysis

Introduction, Types, Methods of Study, Karl Pearson's, Co-efficient of Correlation, Merits and Limitations, Co-efficient of Determination, Probable Errors, Difference between Regression and Correlation. Analysis, Regression Lines.

UNIT IV

NWP Introduction and Basic Concept of Modelling

NWP Equations, Physical processes, Representing the Forecast Variables.

UNIT V

Process of Modelling and Summary of Model Types

NWP Components, Grid Point Models, Spectral Models, Hydrostatic Models, Non Hydrostatic Models.

References :

1. Training Notes – Dept of Met- Vol III
12. Climate of South Asia – GB Pant & K Rupa Kumar
13. Concepts in climatology – PR Crowe

19. General Climatology – Critchfield.
20. International Geophysics Series–Vol28 Urban Climate–Helmut E Landsberg
21. WMO compendium on climatology.
6. Statistical - Schaum Series.
7. Statistical Methods - SP Gupta.
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M.Sc METEOROLOGY

DIPLOMA IN WEATHER FORECASTING TECHNIQUES

SEMESTER IV

PRACTICAL I

UNIT I

Analysis of Surface Charts of different Seasons and Marking of Synoptic Systems.

UNIT II

Analysis of Upper Air Charts and marking of Upper air Circulations, Troughs and Ridges.

UNIT III

Analysis of Auxiliary and derivative Charts.

UNIT IV

Analysis of Tephigram and Calculation of different Stability indices.

UNIT V

Exercise – Identification of Fog, Dust Haze and other atmospheric Obscurities from Satellite Imageries.

DIPLOMA IN WEATHER FORECASTING TECHNIQUES

PRACTICAL II

UNIT I

Interpretation and Processing of Satellite cloud imageries.

UNIT II

Exercise on Identification of Mesoscale Cloud Patterns and features.

UNIT III

Exercise on Identification of different types of clouds from Satellite Imageries

- Cu, CB & CI
- Cu and SC
- SC, St & St and Fog

UNIT IV

Interpretation of Radar Products in Forecasting.

UNIT V

Exercise on making Domain of different Resolutions