

SYLLABUS

FOUR YEARS UNDERGRADUATE PROGRAMME IN IDC_CLIMATOLOGY



समानो मन्त्रः समितिः समानी

UNIVERSITY OF NORTH BENGAL
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W.E.F: ACADEMIC SESSION 2024-25

Semester: 2

PAPER: IDC

Paper Description: CLIMATOLOGY

This paper offers an intricate dynamic of the Earth's atmosphere and climate, focusing on the core principles that govern weather and climatic phenomena. It covers a wide array of topics, including the composition and structure of the atmosphere, mechanisms of heating and cooling, the heat budget, temperature distribution, and isotherms, as well as the distribution of atmospheric pressure. Wind systems, pressure belts, air masses, and disturbances such as cyclones and anticyclones are also included. Additionally, the role of atmospheric moisture in weather processes is also incorporated, covering evaporation, condensation, precipitation, and forms like clouds, fog, dew, frost, and types of rainfall. Special emphasis is given to factors affecting India's climate such as El Niño, the Southern Oscillation and others. The monsoon's mechanism, seasonal variations, phenomena like the break and retreat of monsoon, and regional weather patterns like the Loo and Kalbaisakhi are also included.

Paper Code: EASCIDC205

Paper Type: Theory

Credit: 3 credit theory.

Class hours: 3 theory classes per week.

Duration of the Examinations: 1 hr. 30 minutes.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Understanding the composition and structure of the atmosphere, heat transfer mechanisms, and factors influencing insolation enhances knowledge of Earth's climate systems.
- Exploring temperature distribution, heat budget, and isotherms provides insights into global temperature patterns, while studying atmospheric pressure, wind systems, cyclones, and anticyclones deepens understanding of atmospheric circulation and weather phenomena.
- Examining moisture processes, including condensation and precipitation, clarifies rainfall types and mechanisms.
- Additionally, learning about factors influencing India's climate, such as monsoons, physiography, and climatic oscillations like El Niño, offers a comprehensive view of regional climatic complexities.

Skill Gained:

- Studying the composition and structure of the atmosphere, heat budgets, and circulation patterns enables students to analyse complex environmental data and draw meaningful conclusions about atmospheric dynamics.
- Enhancing students' research skills and capacity to investigate atmospheric processes like evaporation, condensation, and precipitation, as well as analysing wind systems and climate variations.
- Developing proficiency in interpreting isotherms and isobars sharpen students' ability to analyse meteorological data and apply it to real-world scenarios.

Competencies Developed:

- Learning about global phenomena like El Niño, the Southern Oscillation, and temperature inversions encourages students to critically evaluate their impacts on local and global climates.
- Understanding climatic factors and weather patterns enables students to make informed decisions in areas like agriculture, urban development, and resource management.
- Presenting climatic data through visual tools and graphical representations enhances students' ability to effectively convey complex information.

Syllabus Overview:

Theory

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Composition and structure of atmosphere; Heating and cooling of the atmosphere: Radiation, advection, conduction and convection; Insolation and factors affecting insolation; Heat budget; Horizontal and vertical distribution of temperature; Inversion of temperature; Isotherms: Their characteristics.	3
2	Atmospheric pressure: Horizontal and vertical distribution, factors affecting their distribution, characteristics of isobar; Pressure belts and winds: Types of winds, air masses and atmospheric disturbances; Cyclone: Temperate and tropical; Ani-cyclone; Atmospheric moisture: Processes of evaporation, condensation and precipitation; Relative and absolute humidity; Forms of condensation: Cloud, fog, dew and frost; Forms of precipitation: Snow, hail and rain; Types of rainfall: Conventional, orographic and cyclonic.	
3	Factors affecting India's climate: Latitudinal extent, distance from the sea, northern mountain ranges, physiography, monsoon winds, upper air circulation, western disturbances and tropical cyclones, southern oscillation, El Nino; Understanding the concept and mechanism of monsoon; Break in monsoon; Retreat of the monsoon; Seasons of India; Loo; Kalbaisakhi.	

Suggested Reading

- Barry, R. G., & Carleton, A. M. (2001). *Synoptic and Dynamic Climatology*. New York: Routledge.
- Barry, R. G., & Corley, R. J. (1998). *Atmosphere, Weather and Climate*. New York: Routledge.
- Chatterjee, I. (2018). *Jalabayu Bigyan* (7th ed.). Paschimbongo Rajya Pustak Parshad.
- Critchfield, H. J. (1987). *General Climatology*. New Delhi: Prentice-Hall of India.
- Hazra, J., & Banik, G. C. (2020). *Adhunik Abohawa O Jolobayu Bigyan*. Nabodaya Publication.
- Husain, M. (2003). *Climatology*. Anmol Publications Pvt. Ltd.
- Lal, D. S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.
- Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2009). *The Atmosphere: An Introduction to Meteorology*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Majumder, S. (2022). *Adhunik Abohawa O Jalabayu Bigyan*. Sandhya Prakashani.
- Oliver, J. E., & Hidore, J. J. (2002). *Climatology: An Atmospheric Science*. New Delhi: Pearson Education.

Ahamed, R. (2015). *Abohawa o Jalbayu Bigyan*. Gyankosh Publishers.

Saha, P., & Bhattacharyya, P. K. (2018). *Adhunik Jalabayu Bidya* (6th eds.). Paschimbongo Rajya Pustak Parshad.

Saha, P.K. & Basu P. (2004). *Advanced Practical Geography*. Books and Allied Kolkata.

Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.

Siddharth, K (2016). *A Climatology Atmosphere, Weather & Climate*. Kitab Mahal.

Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

Singh, S. (2013). *Climatology*. Allahabad: Prayag Pustak Bhawan.

Trewartha, G. T., & Horne, L. H. (1980). *An Introduction to Climate*. McGraw-Hill.

Question Pattern

Type	Marks	Total
MCQ	02: 20 out of 20.	40
CE	20: Tutorial	20
Full marks		60