



SEMESTER-II

PHYIDC151T

UNDERSTANDING THE CLIMATE

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

***Course objective:** This course introduces students to Earth-Atmosphere and Meteorology including environmental pollution and climate change etc. This course is useful for the students who want to work in Meteorological department or intend to gather more knowledge in the field of environmental science.*

Unit 1: Introduction to Earth Atmosphere and Meteorology

Elementary concept of atmosphere and its composition. Introduction to atmospheric dynamics, Basic conservation laws. Thermal and pressure variation in earth atmosphere, Thermal structure of the troposphere, stratosphere, mesosphere and ionosphere, spectral distribution of the solar radiation. Meteorological process and different system, Overview of meteorological observations. **(10 Lectures)**

Unit 2: Climate Science

Weather and climate. Biodiversity and climate change, Impact of deforestation, fossil fuel burning, industrialization. Surface weather stations and satellite observation. Cloud seeding, lightning and discharge. Formation of trade winds, local winds, monsoons, fogs, clouds, Cyclones, anti-cyclones, thunderstorms, droplet growth and condensation. humidity and humidity parameters. **(8 Lectures)**

Unit 3: Changing Climate

Definition of climate long term changes, Natural causes of climate change. Detection of climate Change. Carbon-di-oxide, trace gases and climate change. Greenhouse effect and global warming, Manifestations of global warming in the form of sea level rise, melting of glaciers, variation in monsoon patterns. Weather extremes: increase in frequency and intensity of cyclones, hurricanes, tornadoes, heat waves EL Nino/LA Nino. **(10 Lectures)**

Unit 4: Instrumentation and Observational Techniques

Convictional measurements of pressure, temperature, humidity, wind speed and direction, sunshine duration, radiation clouds, upper air pressure, temperature, humidity and wind measurements. Application of radars to study the atmospheric phenomenon, SONAR. Atmospheric aerosols, classification and properties, concentration and size distribution. **(8 Lectures)**



Unit 5: Environmental pollution and Mitigation of Climate change

Atmospheric pollution, type of pollutants, various sources of emissions, Trace gases, Production and loss processes of stratosphere ozone, Tropospheric ozone. International legal and policy framework for climate change, the Kyoto protocol, Main issues. Climate change adaption and developmental planning, Climate change mitigation, Geo-engineering as a tool to mitigate global warming. Concept of Panchamrit. **(9 Lectures)**

Expected learning outcomes: At the end of this course the students are expected to learn basic concepts of earth atmospheric composition, meteorological processes, weather and climate, climate change and ways of mitigating the issues of climate change along with various types of environmental pollutions.

Reference Books

- i. Basics of Atmospheric Science – A Chndrashekar, PHI Learning Private Ltd. New Delhi, 2010.
- ii. Fundamental of Atmospheric Modelling – Mark Z Jacobson, Cambridge University Press, 2000.
- iii. Atmosphere: An Introduction to meteorology – Frederik K Lutgens and Edward J Tarbuck, Pearson, 2013