

## **PHY-AD03: ADD-ON DIPLOMA IN ASTRONOMY**

Objective of the Course: To provide background, current status and applications of Astronomy to the students of Science and Humanities and Astrophysical aspects of Astronomy to students of Physics, Mathematics, Computer Science and Electronics

**Eligibility:** 10+2 or equivalent with 50% marks. Regular students of UG or PG courses of the University will be eligible to offer this course as an add-on Diploma.

**Reservation:** SC/ST/OBC as per university rules.

**Duration:** One Year part time, 80 hrs of teaching

**Fee:** Rs 2000/- (For regular students from University Departments), Rs 3000/- for others

**Seats:** Thirty

**Examination:** Examination will be conducted in theory and practical by the university. Theory paper will be of 100 marks and 3hrs duration consisting eight questions out of which candidates will be required to answer any five. Practical paper will be of six hours duration carrying 100 marks. Total marks of the examination will be 200.

In order to be eligible for the Diploma, a candidate is required to score 50% of the total marks. Those who fail to get 50% marks will be required to

reappear in the examination as and when conducted by the university. Candidates who offer this course as a part-time course and nor regular students of the university will be awarded a Certificate in place of Diploma.

## **SYLLABUS**

### **ASTRONOMY**

Introduction to Astronomy: Understanding of our Universe, Basic idea of theories of stellar evolution, Milky way Galaxy, Solar System. Brief study of Planets, comets and asteroids

The sky and the observational tools: Concept of Wavelength and its use in the observations, Radio, Infrared, Optical, UV, X-rays and Gamma Rays. Basic principles of Telescopes, Ground based and Sky based Telescopes. Construction of a telescope for Astronomical observations.

Stellar structure and evolution: Stellar Parameters : Mass, Radius, Chemical composition and HR diagram

Stellar Atmosphere: Absorption and emission of radiation

Brief summary of Planetary Nebulae and Supernova

Stellar Energy: Sources of Stellar energy, Radiation energy, magnetic energy, Mass loss and diffusion

Stellar Pulsations: Brief idea of Helio and Astro seismology.

**Choose any one unit from following**

## UNIT-A

Solar system and effects on the earth: Effects of Solar system, planets and radiations on climate of the earth, human beings, animals, ecological balance in the environment including global warming.

Asteroids effects on atmosphere of the earth and their role in the accumulation of energy in the atmosphere of the earth. Introduction of the comets and its appearance and its effects on the earth. Milky way and its morphology, Extra terrestrial life: Brief survey of existing theories and recent findings.

## UNIT-B

Condensed Objects and High Energy Astrophysics: Compact objects, White dwarfs and Chandrasekhar Limit. Neutron stars and Black holes: Pulsars, X-ray and Gamma-ray sources. Binary Systems: Accretion Process and associated phenomena: Bursts and Quasi-periodic oscillations.

Blackbody, Bremsstrahlung, Cyclotron, Synchrotron and inverse Compton emission. Interaction of high-energy particles and photons with matter. Acceleration of particles to high energy. Very High Energy Cosmic Rays. Gamma ray Bursts.

## UNIT-C

Relativity and Cosmology, Einstein's field equations (qualitative description) FRW metric. Hubble law for Expanding Universe, Age and distance scale in cosmology. Cosmological Parameters. Early Universe: Thermal history and Nucleosynthesis of light elements. Structure formation. Cosmic Microwave Background Radiation: Observations and Inferences

References:

1. Endless Universe: Beyond the Big Bang by Paul J. Steinhardt, 2007
2. The Fabric of the Cosmos, Brian Greene, 2005
3. Universe in a Nutshell, Stephen William Hawking, 2001
4. Nightwatch: A practical Guide to viewing Universe, Terence Dickinson, Timothy Ferris, Adolf Schaller, and Victor Costanzo, 1998