Birla Institute of Technology & Science, Pilani
Hyderabad Campus

II SEMESTER 2022-23
Course Handout Part II

Date: 16.01.2023

Course No. : **PHY F215**
Course Title : **INTRODUCTION TO ASTRONOMY & ASTROPHYSICS**
Instructor in Charge : **Subhash Karbelkar**

Objectives & Scope of the Course:

The course aims to give Physics/non-Physics major students an elementary introduction and overview of Astronomy & Astrophysics. This is for students who were always curious about the sky out there but never had a chance to know it deeper. And of course, for students who want to pursue their career in Astro. The course covers a broad spectrum of topics, in astronomy and astrophysics.

Text Book: Modern Astrophysics, Carrol and Ostlie, Cambridge 2017
Reference book: The Physical Universe, F Shu, University Science Books, 1981
Detailed Course Plan:

Number of lectures	Learning objectives	Topics to be covered	Chapter in the Text Book
3	**Telescopes**	Basic optics, optical, radio telescopes, IR, UV, X-ray and gamma ray astronomy, gravitational wave astronomy	6
3	**Binary systems**	Determination of stellar parameters: classification and mass determination,	7
3	**Classification of stellar spectra**	The formation of spectral lines, the Herzsprung-Russel diagram	8
6	**Stellar atmossphere**	Radiation field, stellar opacity, radiative transfer, transfer equation, the profiles of spectral lines	9
6	**Stellar interiors**	Hydrostatic equilibrium, pressure equation of state, stellar energy sources, energy transfer and thermodynamics, stellar model building, the main sequence	10
3	**ISM and star formation**	Interstellar dust and gas, the formation of protostars, pre-main-sequence evolution	12
3	**Stellar evolution**	Evolution on the main sequence, late stages of stellar evolution, stellar clusters	13
1	**Stellar pulsation**	Observations and the physics of stellar pulsation	14.1,14.2
3	**Massive stars**	Evolution of massive stars, classification of supernovae, gamma ray bursts, cosmic rays	15

3	**Degenerate remnants of stars**	White dwarfs, the physics of degenerate matter, the Chandrasekhar limit, neutron stars, Pulsars	16
3	**The structure of universe**	The extragalactic distance scale, the expansion of the Universe, clusters of galaxies	27
3	**cosmology**	Newtonian cosmology, the cosmic microwave background	29
2	**The early universe**	The very early universe and inflation, the origin of structure	30

5. Evaluation Scheme:

	Evaluation	**Duration**	**Weightage (%)**	**Date, Time**	**Nature of Component**
1.	Mid-Sem	90 mins.	30	17/03 4.00 - 5.30PM	Closed Book
2	Class tests I before and II after the midsem	50 minutes each	30		Open Book
3	Comprehensive Examination	180 mins.	40	18/05 AN	Closed Book

6. Chamber Consultation Hour: TBA

7. Notices: Notices for the course will be displayed only on CMS.

8. Make-up Policy: Make up for Mid-Sem and Compre will be given to emergency (hospitalization) case only. Make up requests should reach the IC before the examination.

9. Academic Honesty and Integrity Policy:

Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
PHY F215