

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

Independent Elective Course Offered by Department of Physics to  
B A. / B.Sc. / B.Com. / B.C.A. / B.S.W. Degree Programmes

**SYLLABUS**

(Effective from the academic year 2015 – 2016)

**ASTROPHYSICS**

**CODE: 15PH/UI/AP23**

**CREDITS: 3**

**OBJECTIVE OF THE COURSE**

- To learn about stars and constellations

**Unit 1**

**Our Place in the Universe and Solar System**

- 1.1 Introduction: Our Place in the Universe-the Sky- the Constellation- Annual Motion of the Sun-Wanderers-Time and the Calendar
- 1.2. The Solar System: Introduction-Asteroids-Meteoroids-Meteors-Comets-Solar Photon- Magnetosphere- Solar Flares-Maunder Minimum-Solar-Terrestrial Relations

**Unit 2**

**Stars-Introduction**

- 2.1 Stars: Description-Stellar Distances -Absolute Magnitude- Stellar Spectra-the Hertzsprung Russell Diagram
- 2.2 Stellar Sizes-Binary Stars-Eclipsing Binaries-Common Stars- Stellar-Mileposts

**Unit 3**

**Life History of Stars**

- 3.1 Life History of Stars: The Internal Structure of a Star
- 3.2 Stellar Evolution- Supernovae, Pulsars, Black Holes- Chandrasekhar's Limit and Neutron Stars

**Unit 4**

**Our Galaxy**

- 4.1 Our Galaxy: Star Clusters-Interstellar Matter - the Galaxy-Stellar Population- the Centre of the Galaxy
- 4.2 Light and Telescope : the Nature of Light – Telescopes- Detecting Light – Invisible Radiation- the Inverse Square Law

**Unit 5**

**The Universe**

- 5.1 The Universe-Galaxies-the Distance Scale-the Expanding Universe
- 5.2 Radio Galaxies- Cosmology

**TEXT BOOKS**

Abhyankar. *Astrophysics-Stars and Galaxies*. Hyderabad: University, 2001.

## **BOOKS FOR REFERENCE**

Baidayanath Basu. *An Introduction to Astrophysics*. New Delhi: Prentice, 1997.

Bhatia V.B. *Astronomy and Astrophysics with Elements of Cosmology*. New Delhi: Narosa, 2001.

Kumaravelu and Susheela Kumaravelu. *Astronomy*. Nagercoil: Diocesan, 1981.

Owen Gingerich. *New Frontiers in Astronomy*. San Fransisco: W.H.Freeman, 1970.

## **JOURNAL**

The Astrophysical Journal - IOPscience  
[iopscience.iop.org/0004-637X/](http://iopscience.iop.org/0004-637X/)

International Journal of Astronomy and Astrophysics  
[www.scirp.org/journal/ijaa/](http://www.scirp.org/journal/ijaa/)

## **WEB RESOURCES**

Astrophysics - NASA Science - Science@NASA  
[science.nasa.gov/astrophysics](http://science.nasa.gov/astrophysics)

Astronomy, astrophysics & cosmology - physicsworld.com

## **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered)

Section C – 3 x 15 = 45 Marks (3 out of 4 to be answered)

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**SYLLABUS**

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**GEOPHYSICS**

**CODE: 15PH/UI/GP23**

**CREDITS: 3**

**OBJECTIVE OF THE COURSE**

- To learn the basics of Geophysics and the dynamics of Earth

**Unit 1**

**The Earth as a Planet**

- 1.1 Solar System - Kepler's Law of Planetary Motion - Bode's Law
- 1.2 Characteristics of Planet - Origin of the Solar System - Earth's Structure

**Unit 2**

**Gravity and the Figure of the Earth**

- 2.1 Earth Size and Shape - Gravitation- Law of Universal Gravitation- Gravitational Acceleration - Gravitational Potential
- 2.2 Earth's Rotation - Earth's Figure and Gravity

**Unit 3**

**Seismology and Seismic Waves**

- 3.1 Elastic Theory- Elastic - an Elastic and Plastic Behavior of Materials - Elastic Waves - Body Waves - Surface Waves
- 3.2 Seismograph – Introduction - Various Seismometers - Seismic Wave Propagation- Introduction - Huygens's Principle – Diffraction - Fermat's Principle

**Unit 4**

**Geomagnetism**

- 4.1 Introduction - Discovery of Magnetism - Magnetic Properties of Material- Diamagnetic - Paramagnetic – Ferromagnetic - Curie Temperature
- 4.2 Magnetometers - Flux Gate Magnetometer - Proton Precession Magnetometer

**Unit 5**

**Petroleum Geology**

- 5.1 Introduction (Origin and Theory of Hydrocarbons) - Source Rock – Migration - Reservoir Rock - Classification of Reservoir Rocks - Physical Characteristic of Reservoir Rock (Depth, Area and Thickness, Porosity, Permeability) - Cap Rocks
- 5.2 Traps - Types of Traps (Structural Traps, Salt Dome Traps, Stratigraphic Traps, Combinational Traps)

## **TEXT BOOKS**

Baker Hugher *INTEQ. Petroleum Geology*. Mexico: Bureau of Mines, 1999.

Robert.J.Lilie. *Whole Earth Geophysics*. New Jersey: Prentice, 1999.

William Lowrie, *Fundamentals of Geophysics*. U.K: Cambridge, 1997.

## **REFERENCE BOOKS**

Don.L.Anderson. *Theory of the Earth*, Boston: Blackwell Scientific, 1989

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