

AC – 28/03/2025

Item No. – 6.2 (N) (6a) Sem. III

As Per NEP 2020

University of Mumbai



Syllabus for Basket of OE Vertical 3

Faculty of Science

Board of Studies in Physics

Second Year Programme

Semester

III

Title of Paper

Credits

Astronomy and Space Missions – I

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From the Academic Year

2025-26

Title of Paper - Astronomy and Space Missions – I

Sr. No.	Heading	Particulars
1	Description of the course : Including but Not limited to :	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	Vertical :	Open Elective
3	Type :	Theory / Practical
4	Credit:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives: (List some of the course objectives) After successful completion of this course students will be able to: 1) Understand the evolution of astronomy over time, basic principles of optical instruments, including telescopes and binoculars. 2) Learn how to set up and use telescopes effectively. Also, identify star clusters, planets, and satellites through observation.	
8	Course Outcomes: (List some of the course outcomes) After the end of this course student will be able to, 1) Understand the historical growth of Astronomy, basic principle of optical instruments such as telescope, binoculars. 2) Acquire the skills to set up the telescope and recognize the star clusters and also the planets and satellites.	
9	Modules:- Per credit One module can be created Module 1: Unit-I: History & Introduction (15 Lectures)	

- 1. Ancient Astronomy:** Vedic Astronomy, Ancient Astronomy – Aryabhata, Varahamihira, Bhaskara Greek, Sumerian, Mayan, Egyptian, Arabic and Chinese Observations
- 2. Medieval Astronomy:** Geocentric Model, Heliocentric Model Observations by Tycho Brahe, Kepler, Galileo, Herschel and others.
- 3. Tools for Astronomy:** Invention of Telescopes Pin Hole, Binoculars, Telescopes & Imaging.
- 4. Modern Astronomy:** Hubble's discovery, Stellar Evolution (Brief), Microwave, Radio Telescopes

Observational Terminologies: Cardinal Directions, Azimuth, Altitude, Measurements using Compass and Hand. Equatorial Co-ordinates, Light years, Magnitude, Colors.

Module 2: Unit-II: Observational Astronomy

(15 Lectures)

- 1. The Sun:** Ecliptic and the Orientation of the Earth, Seasons - Solstices and Equinox, Observations of the Sun from Earth during seasons. Zero-shadow day Sunspots.
- 2. The Moon:** Earth-Moon system – Phases, Lunar Eclipses, Ecliptic and Lunar Orbital Plane – Nodes, Lunar Month, Full Moon Names.
- 3. Inner Planets:** Mercury & Venus: Observational History, Observational Windows, Appearance, Apparitions, Elongations, Superior Conjunctions, Inferior Conjunctions, Transits.
- 4. Outer Planets:** Mars, Jupiter & Saturn: Observational History, Observational Windows, Appearance, Frequency of Oppositions Oppositions, Conjunctions, Galilean Moons, Saturn's Rings
- 5. Distant or Minute Objects:** Uranus, Neptune & Asteroids: Observational History, Observational Windows, Asteroid Belt, Prominent Asteroids.
- 6. Comets & Meteors:** Origin, Orbital Nature, Historical Observations, Prominent Comets and Asteroids., Meteors, Origins and Showers
- 7. Occultations, Transits and Eclipses:** Definitions, Prominent Occultations and Transits, Eclipses – Types and prominent occurrences. Famous Eclipses in the past.

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Reference Books:

1. The Amateur Astronomer-Sir Patrick Moore-Springer (2006)
2. Handbook of Practical Astronomy-Gunter D. Routh-Springer (2009)
3. Fundamental Astronomy-Hannu Karttunen-Springer (2007)
4. Guide to Night Sky-P. Shankar-KRVP (2007)
5. The Complete Idiot's Guide to Astronomy-Christopher De Pree and Alan Axelrod-Pearson (2001)

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Internal Continuous Assessment: 40%

**External, Semester End Examination
60% Individual Passing in Internal and
External Examination**

12	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	
13	Format of Question Paper: for the final examination	
	Format of Question Paper for OE:	External – 30 Marks (2 Credits) Internal – 20 Marks
	Question Paper Format for 30 Marks	
	Duration: One Hour	
	Unit -I (15Marks)	Q:1 A) Attempt any TWO 10Marks i) Theory ii) Theory iii) Theory iv) Theory B) Attempt any One 05 Marks i) Problem ii) Problem
	Unit -II (15Marks)	Q:2 A) Attempt any TWO 10Marks i) Theory ii) Theory iii) Theory iv) Theory B) Attempt any One 05 Marks i) Problem ii) Problem

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