INDIAN SPACE SCIENCE OLYMPIAD

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SYLLABUS - SENIOR CATEGORY

PRELIMINARY LEVEL

Orbits, Satellites & Rocketry

Kepler's Laws and planetary orbits. Newton's Law, Centripetal force and Planetary orbits
Different types of satellite orbits (LEO, MEO, GEO).
Fundamentals of rocketry- Concept of Rocket Equation, Staging, Fuels and Modern Technologies.

Indian Space Program

Brief History of Indian space research, Indian rockets and launch vehicles. Important Indian space missions. Satellite technology for civilians. ISRO's future missions

Basic Astronomy

Historical evolution of Astronomy and space science. Diurnal, Monthly and Annual Changes in the Sky. Celestial coordinate systems. Tilt of Earth's axis and seasons.
Moon phases, tidal forces, and tidal locking. Lunar and solar eclipses. Formation and evolution of the Moon

The Solar System

Formation of the Solar System. Planets and its major properties. Important Moons in the Solar System. Major mission to each planet. Comets asteroids and trans neptunian objects

FINAL LEVEL

Telescopes and Observatories

Radio Telescopes and X Ray Telescopes.
Major observatories in India. Adaptive Optics. Space Observatories. Multimessenger Astronomy (Gwaves, Neutrionos etc). Modern astronomical instrumentations

Measuring the Cosmos

Measurement of distances (Parallax method, Standard Candle method)
Spectra of Stars, Doppler Effect. Velocity measurements etc.

Stellar Evolution

Formation of Stars. Stellar properties. Basic Nuclear Physics. Stellar Evolution. Structure of a Main Sequence Star. Sun and Space Weather
Death of sunlike stars and Giant stars. (physics behind Multiwavelength emissions)

Cosmology and the Universe

Foundations of Modern Cosmology, Expanding Universe, Big Bang Model, Dark Matter, Dark Energy and Accelerated Expansion, Large-Scale Structure of the Universe, Cosmological Distance Measures, Exoplanets in a Cosmological Context, Open Questions and Frontiers

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