ANTHARIKSH

The Space...

DEPARTMENT OF AEROSPACE ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

MYLAVARAM, ANDHRA PRADESH, INDIA.

Vision of the Department:

To achieve academic excellence and produce highly competent professionals in the field of Aerospace Engineering

Mission of the Department:

DM1: To impart high quality education in Aerospace Technology through class room teaching and laboratory practice
DM2: To develop indigenous Aerospace Technology by carrying out research in collaboration with industry and research organizations
DM3: To train and inspire the student community to possess effective communication and leadership skills with ethical values
DM4: To harness the technological development by being consistently aware of societal needs and challenges

Program Educational Objectives (PEOs)

PEOs	Statement
PEO1	To provide students with sound mathematical, engineering and multidisciplinary knowledge to solve Aerospace and Allied Engineering problems
PEO2	To prepare students to excel in higher education programs and to succeed in industry/academia profession.
PEO3	To inculcate ethical attitude, leadership qualities, problem solving abilities and life-long learning for a successful professional career

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigation of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including predictions and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design

PSO2: To prepare the students to work effectively in Aerospace and Allied Engineering organizations

FOCUS AND SCOPE

Anthariksh is a department magazine, bridges the gap between students and faculty. Typically, a department magazine consists of Technical articles, ideas, project outcomes, language skills, literary articles, technical updates, success stories, career tips, academic advice, the latest events and happenings related to campus. Cover-stories have to be written in an engaging format. We can also include interviews of former students who have achieved success through dedication and hard work.

PUBLICATION FREQUENCY:

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Send your articles to the following mail ID.

E-Mail: antharikshlbrce@gmail.com

Disclaimer

Some of the contents published in this magazine are from open sources. The contents of this magazine are for information purposes only, enabling the faculty and students to have easy and quick access to information and do not have any legal sanctity. This magazine is intended for circulation among students of the department of Aerospace Engineering of LBRCE only.

Earth's Orbits

Mr.Samuel Morris

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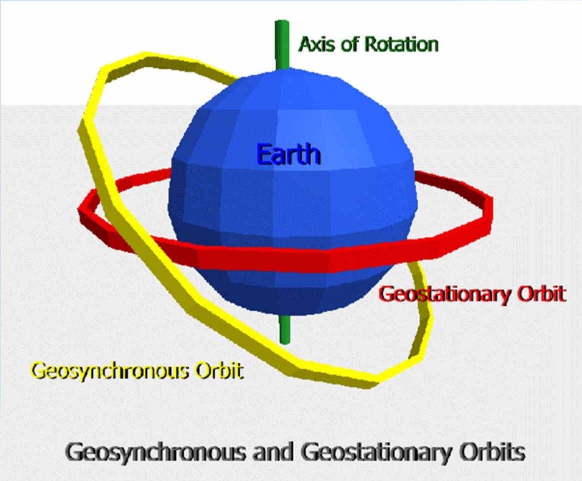
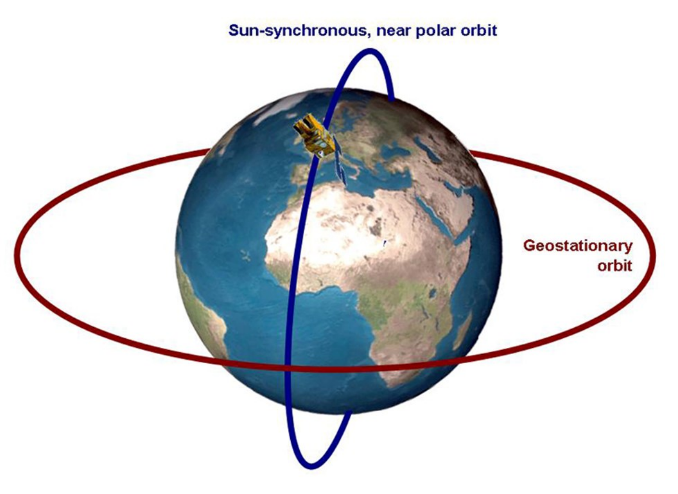




•High Earth Orbit: When a satellite reaches about 36,000 km from Earth's surface, it enters a sort of "sweet spot" in which its orbit matches Earth's rotation. Because the satellite orbits at the same speed that the Earth is turning, the satellite seems to stay in place over a single longitude, though it may drift north to south. This special, high Earth orbit is called geosynchronous.

•A satellite in a circular geosynchronous orbit directly over the equator (eccentricity and inclination at zero) will have a geostationary orbit that does not move at all relative to the ground. It is always directly over the same place on the Earth's surface.

•A geostationary orbit is extremely valuable for weather monitoring because satellites in this orbit provide a constant view of the same surface area.

•Just as the geosynchronous satellites have a sweet spot over the equator that lets them stay over one spot on Earth, the polar-orbiting satellites have a sweet spot that allows them to stay in one time. This orbit is a Sun-synchronous orbit, which means that whenever and wherever the satellite crosses the equator, the local solar time on the ground is always the same.

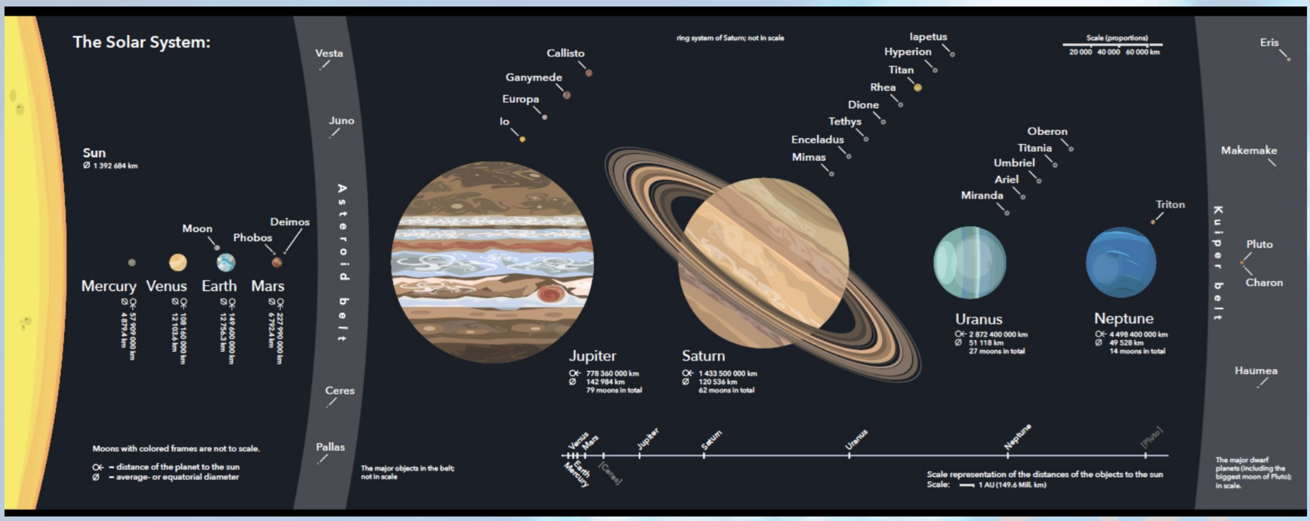
•Without a Sun-synchronous orbit, it would be very difficult to track change over time. It would be impossible to collect the kind of consistent information required to study climate change.

•The path that a satellite has to travel to stay in a Sun-synchronous orbit is very narrow. If a satellite is at a height of 100 kilometers, it must have an orbital inclination of 96 degrees to maintain a Sun-synchronous orbit. Any deviation in height or inclination will take the satellite out of a Sun-synchronous orbit. Since the drag of the atmosphere and the tug of gravity from the Sun and Moon alter a satellite's orbit, it takes regular adjustments to maintain a satellite in a Sun-synchronous orbit.

•Many weather and some communications satellites tend to have a high Earth orbit, farthest away from the surface.

•Satellites that orbit in a medium (mid) Earth orbit include navigation and specialty satellites, designed to monitor a particular region.

•Most scientific satellites, including NASA's Earth Observing System fleet, have a low Earth orbit.



The minimum distance from the Earth to Mars is about 54.6 million kilometers. The farthest apart they can be is about 401 million km. The average distance is about 225 million km.

Indian Rocket Technology

Mr.Sk.Vanhar Ali

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- Satellite Launch Vehicle-3 (SLV-3) was India's first experimental satellite launch vehicle, which was an all solid, four stage vehicle weighing 17 tonnes with a height of 22m and capable of placing 40 kg class payloads in Low Earth Orbit (LEO).
- The Augmented Satellite Launch Vehicle (ASLV) Programme was designed to augment the payload capacity to 150 kg, thrice that of SLV-3, for Low Earth Orbits (LEO). While building upon the experience gained from the SLV-3 missions, ASLV proved to be a low cost intermediate vehicle to demonstrate and validate critical technologies, that would be needed for the future launch vehicles like strap-on technology, inertial navigation, bulbous heat shield, vertical integration and closed loop guidance.
- Launchers or Launch Vehicles are used to carry spacecraft to space. India has two operational launchers: Polar Satellite Launch Vehicle (PSLV) and Geosynchronous Satellite Launch Vehicle (GSLV).
- GSLV with indigenous Cryogenic Upper Stage has enabled the launching up to 2 tonne class of communication satellites.

Indigenous Cryogenic Engine and Stage

Mr.V.Gopala Krishna

16761A2140

- A Cryogenic rocket stage is more efficient and provides more thrust for every kilogram of propellant it burns compared to solid and earth-storable liquid propellant rocket stages. Specific impulse (a measure of the efficiency) achievable with cryogenic propellants (liquid Hydrogen and liquid Oxygen) is much higher compared to earth storable liquid and solid propellants, giving it a substantial payload advantage.

- Oxygen liquifies at -183 deg C and Hydrogen at -253 deg C. The propellants, at these low temperatures are to be pumped using turbo pumps running at around 40,000 rpm. It also entails complex ground support systems like propellant storage and filling systems, cryo engine and stage test facilities, transportation and handling of cryo fluids and related safety aspects

India's Light Combat Aircraft (LCA), Tejas

V.V.Pranitha

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- The Tejas, or 'radiance', is an indigenous fighter aircraft jointly developed by Aeronautical Development Agency and Hindustan Aeronautics Limited. It is the smallest lightweight, multi-role, single-engine tactical fighter aircraft in the world and is being developed in single-seat fighter and twin seat trainer variants for the Indian Air Force and Indian Navy.
- India's Light Combat Aircraft (LCA) together with its variants, is the smallest and lightest Multi-Role Supersonic Fighter Aircraft of its class. This single engine, Compound-Delta-Wing, Tailless Aircraft is designed and developed by ADA with HAL as the principal partner along with DRDO, CSIR, BEL, DGAQA, IAF & IN to meet diverse needs of the Indian Air Force (IAF) and Indian Navy (IN).

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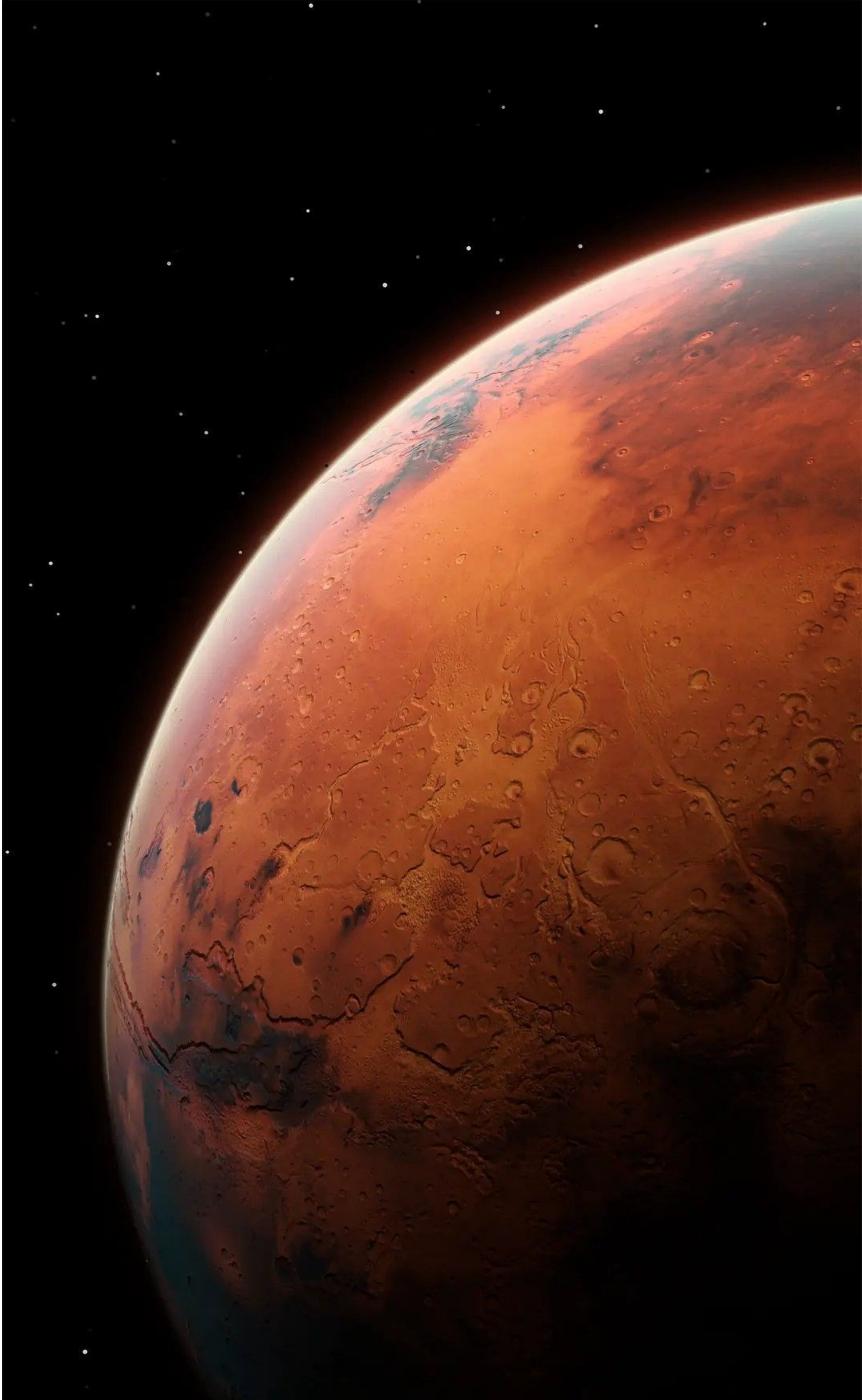

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