



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

AERONAUTICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	SPACE MECHANICS
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Course Faculty	:	Dr. P K Mohanta, AE

OBJECTIVES:

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I INTRODUCTION TO SPACE MECHANICS						
1	What do you mean by solar system?	The Solar System is the gravitationally bound planetary system of the Sun and the objects that orbit it, either directly or indirectly.	Remember	CO 1	CLO 1	AAE0016.01
2	What is major planets?	The planets orbiting in between the Sun and asteroid are known as major planets.	Remember	CO 1	CLO 1	AAE0016.01
3	What is minor planets	The planets orbiting in between the asteroid belt and the Sun are known as major planets.	Remember	CO 1	CLO 2	AAE0016.02
4	What is Asteroid belt?	The asteroid belt is a region of space between the orbits of Mars and Jupiter where most of the asteroids in our Solar System are found orbiting the Sun. The asteroid belt probably contains millions of asteroids.	Remember	CO 1	CLO 2	AAE0016.02
5	What is comets?	A comet is an icy, small Solar System body that, when passing close to the Sun, warms and begins to release gases, a process called outgassing. This produces a visible atmosphere or coma, and sometimes also a tail.	Remember	CO 1	CLO 2	AAE0016.02
6	What is meteors?	A meteor is an asteroid or other object that burns and vaporizes upon entry into the Earth's atmosphere; meteors are commonly known as "shooting stars."	Remember	CO 1	CLO 2	AAE0016.02

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7	What is international date line?	The International Date Line is an imaginary line of demarcation on the surface of Earth that runs from the North Pole to the South Pole and demarcates the change of one calendar day to the next.	Remember	CO 1	CLO 1	AAE0016.01
8	What is prime meridian?	A prime meridian is a meridian in a geographic coordinate system at which longitude is defined to be 0°.	Remember	CO 1	CLO 1	AAE0016.01
9	What is longitude?	Longitude, is a geographic coordinate that specifies the east–west position of a point on the Earth's surface, or the surface of a celestial body. It is an angular measurement, usually expressed in degrees and denoted by the Greek letter lambda.	Remember	CO 1	CLO 1	AAE0016.01
10	What is equator?	An equator of a rotating spheroid is its zeroth circle of latitude. It is the imaginary line on the spheroid, equidistant from its poles, dividing it into northern and southern hemispheres.	Remember	CO 1	CLO 1	AAE0016.01
11	What is zenith?	The zenith is an imaginary point directly "above" a particular location, on the imaginary celestial sphere.	Remember	CO 1	CLO 1	AAE0016.01
12	What is horizon?	The horizon or skyline is the apparent line that separates earth from sky.	Remember	CO 1	CLO 1	AAE0016.01
13	What is known as local time?	Definition of Local Time. Local time, as the name suggest is the time in a specific region, which is expressed in relation to the line of longitude passing through it. It is the time, reckoned on the basis of the meridian running through a particular place.	Remember	CO 1	CLO 1	AAE0016.01
14	What is standard time?	Standard time is the synchronization of clocks within a geographical area or region to a single time standard, rather than using solar time or a locally chosen meridian to establish a local mean time standard.	Remember	CO 1	CLO 1	AAE0016.01
15	What is GMT?	Greenwich Mean Time is the mean solar time at the Royal Observatory in Greenwich, London, reckoned from midnight.	Remember	CO 1	CLO 1	AAE0016.01
16	What is Lagrangian points?	In celestial mechanics, the Lagrangian points are the points near two large bodies in orbit where a smaller object will maintain its position relative to the large orbiting bodies.	Remember	CO 1	CLO 3	AAE0016.03
17	What is vernal equinox?	An equinox is commonly regarded as the instant of time when the plane of Earth's equator passes through the center of the Sun. This occurs twice each year: around 20 March and 23 September.	Remember	CO 1	CLO 1	AAE0016.01

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UNIT-II						
THE TWO BODY PROBLEM						
1	What is orbit?	In physics, an orbit is the gravitationally curved trajectory of an object, such as the trajectory of a planet around a star or a natural satellite around a planet. Normally, orbit refers to a regularly repeating trajectory, although it may also refer to a non-repeating trajectory.	Remember	CO 2	CLO 6	AAE0016.06
2	What is ellipse?	An ellipse is a plane curve surrounding two focal points, such that for all points on the curve, the sum of the two distances to the focal points is a constant.	Remember	CO 2	CLO 5	AAE0016.05
3	What is Molniya orbit?	A Molniya orbit is a type of satellite orbit designed to provide communications and remote sensing coverage over high latitudes.	Remember	CO 2	CLO 5	AAE0016.05
4	What is ISS?	The International Space Station is a space station, or a habitable artificial satellite, in low Earth orbit.	Remember	CO 2	CLO 5	AAE0016.05
5	What is low earth orbit?	A Low Earth Orbit is an Earth-centered orbit with an altitude of 2,00 km or less, or with at least 11.25 periods per day and an eccentricity less than 0.25. Most of the manmade objects in outer space are in LEO.	Remember	CO 2	CLO 5	AAE0016.05
6	What is sun-synchronous orbit?	A Sun-synchronous orbit is a nearly polar orbit around a planet, in which the satellite passes over any given point of the planet's surface at the same local mean solar time.	Remember	CO 2	CLO 5	AAE0016.05
7	What is polar orbit?	A polar orbit is one in which a satellite passes above or nearly above both poles of the body being orbited on each revolution. It therefore has an inclination of 90 degrees to the body's equator.	Remember	CO 2	CLO 5	AAE0016.05
8	What is geostationary orbit?	A geostationary orbit, often referred to as a geosynchronous equatorial orbit, is a circular geosynchronous orbit 35,786 km above Earth's equator and following the direction of Earth's rotation. An object in such an orbit appears motionless, at a fixed position in the sky, to ground observers.	Remember	CO 2	CLO 5	AAE0016.05
9	What is graveyard orbit?	A graveyard orbit, also called a junk orbit or disposal orbit, is an orbit that lies away from common operational orbits.	Remember	CO 2	CLO 5	AAE0016.05
10	What is orbital parameters?	Orbital elements are the parameters required to uniquely identify a specific orbit.	Remember	CO 2	CLO 5	AAE0016.05
11	What is state vectors?	In navigation, a state vector is a set of data describing exactly where an object is located in space.	Remember	CO 2	CLO 5	AAE0016.05
12	What is satellite?	A celestial body orbiting the earth or another planet.	Remember	CO 2	CLO 7	AAE0016.07
13	What is launch vehicle?	A launch vehicle or carrier rocket is a rocket propelled vehicle used to carry a payload from Earth's surface to space, usually to Earth orbit or beyond.	Remember	CO 2	CLO 7	AAE0016.07
14	What is transfer orbit?	In orbital mechanics a transfer orbit is an intermediate elliptical orbit that is used to	Remember	CO 2	CLO 7	AAE0016.07

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		move a satellite or other object from one circular, or largely circular, orbit to another.				
15	What is launch window?	In the context of spaceflight, launch period is the collection of days and launch window is the time period on a given day during which a particular vehicle must be launched in order to reach its intended target.	Remember	CO 2	CLO 7	AAE0016.07
16	What is docking?	Docking and berthing of spacecraft is the joining of two space vehicles. This connection can be temporary, or semipermanent such as for space station modules. Docking specifically refers to joining of two separate free-flying space vehicles.	Remember	CO 2	CLO 7	AAE0016.07
17	What is rendezvous?	An arrangement to meet someone, especially secretly, at a particular place and time, or the place itself	Remember	CO 2	CLO 7	AAE0016.07
UNIT-III PERTURBED SATELLITE ORBIT						
1	What is satellite perturbation?	Orbital perturbation analysis is the activity of determining why a satellite's orbit differs from the mathematical ideal orbit.	Remember	CO 3	CLO 9	AAE0016.09
2	What is drag?	In fluid dynamics, drag is a force acting opposite to the relative motion of any object moving with respect to a surrounding fluid.	Remember	CO 3	CLO 9	AAE0016.09
3	What is earth oblateness?	Oblateness of the Earth. a quantity that characterizes the degree to which the earth is flattened in the direction of its axis of rotation, that is, the deviation of the earth's shape from that of a sphere.	Remember	CO 3	CLO 9	AAE0016.09
4	What is J2?	The J2 perturbation due to earth oblateness effect is the most predominant disturbance. The dimensionless parameter which quantifies the major effects of oblateness on orbits is J_2 . The J_2 effect causes a twisting force on orbit of satellite that will change various orbital elements over time.	Remember	CO 3	CLO 9	AAE0016.09
5	What is J3?	The sign of J_3 is irrelevant here because it only interchanges the Northern and Southern Hemisphere properties of the orbits.	Remember	CO 3	CLO 9	AAE0016.09
6	What is in-plane orbit correction?	Orbital inclination change is an orbital maneuver aimed at changing the inclination of an orbiting body's orbit.	Remember	CO 3	CLO 9	AAE0016.09
7	What is out of plane orbit correction?	The main idea is to consider that a satellite is in an orbit around the Earth and that it has its orbit is disturbed by one or more forces. Then, it is necessary to perform a small amplitude orbital correction to return the satellite to its original orbit, to keep it performing its mission.	Remember	CO 3	CLO 9	AAE0016.09
8	What is ascending node?	The ascending node (Ω) is one of the orbital elements that must be specified in order to define the orientation of an elliptical orbit.	Remember	CO 3	CLO 9	AAE0016.09

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
9	What is apogee?	When a satellite is at its furthest point from the earth, it is at the apogee of the orbit.	Remember	CO 3	CLO 9	AAE0016.09
10	What is perigee?	When a satellite is at its closest point to the earth, it is at the perigee of the orbit.	Remember	CO 3	CLO 9	AAE0016.09
11	What is transfer orbit?	In orbital mechanics a transfer orbit is an intermediate elliptical orbit that is used to move a satellite or other object from one circular, or largely circular, orbit to another. There are several types of transfer orbits, which vary in their energy efficiency and speed of transfer.	Remember	CO 3	CLO 9	AAE0016.09
12	What is Hohman transfer?	In orbital mechanics, the Hohmann transfer orbit is an elliptical orbit used to transfer between two circular orbits of different radii in the same plane.	Remember	CO 3	CLO 9	AAE0016.09
S.No	QUESTION	ANSWER	Blooms Level		CLO	CLO Code
UNIT-IV BALLISTIC MISSILE TRAJECTORIES						
1	What is missile?	A weapon that is self-propelled or directed by remote control, carrying conventional or nuclear explosive.	Remember	CO 4	CLO 14	AE0016.14
2	What is multi stage rocket?	Multistage rocket, or step rocket, is a launch vehicle that uses two or more rocket stages, each of which contains its own engines and propellant. A tandem or serial stage is mounted on top of another stage; a parallel stage is attached alongside another stage.	Remember	CO 4	CLO 14	AE0016.14
3	What is rocket booster?	A booster rocket is either the first stage of a multistage launch vehicle, or else a shorter-burning rocket used in parallel with longer-burning sustainer rockets to augment the space vehicle's takeoff thrust and payload capability.	Remember	CO 4	CLO 14	AE0016.14
4	What is coasting?	When the rocket runs out of fuel, it enters a coasting flight. The vehicle slows down under the action of the weight and drag since there is no longer any thrust present. The rocket eventually reaches some maximum altitude.	Remember	CO 4	CLO 14	AE0016.14
5	What is target missile?	Target missiles are guided missiles designed for use as targets for testing and development of other systems.	Remember	CO 4	CLO 14	AE0016.14
6	What is ballistic missile?	A missile with a high, arching trajectory, which is initially powered and guided but falls under gravity on to its target.	Remember	CO 4	CLO 14	AE0016.14
7	What is guided missile?	A missile that is directed by remote control or by internal equipment.	Remember	CO 4	CLO 14	AE0016.14
8	What is payload of a rocket?	For a rocket, the payload can be a satellite, space probe, or spacecraft carrying humans, animals, or cargo. For a ballistic missile, the payload is one or more warheads and related systems; the total weight of these systems is referred to as the throw-weight	Remember	CO 4	CLO 14	AE0016.14
9	What is war-head?	A warhead is the explosive or toxic material that is delivered by a missile, rocket, or torpedo. It is a type of bomb.	Remember	CO 4	CLO 14	AE0016.14

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10	What is sounding rocket?	A sounding rocket, sometimes called a research rocket, is an instrument-carrying rocket designed to take measurements and perform scientific experiments during its sub-orbital flight.	Remember	CO 4	CLO 14	AE0016.14
11	What is re-entry?	Re-entry is the act of returning to a place, organization, or area of activity that you have left.	Remember	CO 4	CLO 14	AE0016.14
12	What is ICBM?	An intercontinental ballistic missile is a guided ballistic missile with a minimum range of 5,500 kilometers primarily designed for nuclear weapons delivery.	Remember	CO 4	CLO 14	AE0016.14
13	What is AGNI?	It ICBM of India indigenously developed by DRDO.	Remember	CO 4	CLO 14	AE0016.14
14	What is Prithivi?	It is surface to surface missile of India indigenously developed by DRDO.	Remember	CO 4	CLO 14	AE0016.14
15	What is Nirbhay?	It is guided missile of India, indigenously developed by DRDO.	Remember	CO 4	CLO 14	AE0016.14
S.No	QUESTION	ANSWER	Blooms Level		CLO	CLO Code

UNIT-V
LOW-THRUST TRAJECTORIES

1	What is thrust?	Thrust is a reaction force described quantitatively by Newton's third law. When a system expels or accelerates mass in one direction, the accelerated mass will cause a force of equal magnitude but opposite direction on that system.	Remember	CO 5	CLO 18	AAE0016.18
2	What is inter planetary trajectory?	Interplanetary trajectories are usually whole or partial orbits around the Sun. When a spacecraft launches it must first fight to break free of the Earth's gravitational field. Once it has done this, it enters interplanetary space, where the dominant force is the gravitational field of the Sun.	Remember	CO 5	CLO 18	AAE0016.18
3	What is low thrust tractor?	In orbital mechanics, low-thrust relative transfer is an orbital maneuver in which a chaser spacecraft covers a specific relative distance relative to the target spacecraft using continuous low-thrust system with specific impulse of the order of 4000-8000s.	Remember	CO 5	CLO 18	AAE0016.18
4	What is launch window?	In the context of spaceflight, launch period is the collection of days and launch window is the time period on a given day during which a particular vehicle must be launched in order to reach its intended target.	Remember	CO 5	CLO 18	AAE0016.18
5	What is radial thrust?	Radial load is the load acting perpendicular to the longitudinal axis. The load can be applied to bearings in either of two basic directions. Radial loads act at right angles to the shaft (bearing's axis of rotation). Axial (thrust) acts parallel to the axis of rotation.	Remember	CO 5	CLO 18	AAE0016.18
6	What is tangential thrust?	Tangential force. (Mech.) a force which acts on a moving body in the direction of a tangent to the path of the body, its effect being to increase or diminish the velocity;	Remember	CO 5	CLO 18	AAE0016.18

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		- distinguished from a normal force, which acts at right angles to the tangent and changes the direction of the motion without changing the velocity				
7	What is Apogee / perigee motor?	An apogee kick motor refers to a rocket motor that is regularly employed on artificial satellites to provide the final impulse to change the trajectory from the transfer orbit into its final orbit	Remember	CO 5	CLO 18	AAE0016.18
8	What is maneuvering of satellite?	When a satellite activates its thrusters movement takes place — this is known as a manoeuvre. Sometimes we need to correct or change the orbit of a satellite because a number of forces act on a satellite to change its orbit over time.	Remember	CO 5	CLO 18	AAE0016.18
9	What is re-entry?	Re-entry is the act of returning to a place, organization, or area of activity that you have left.	Remember	CO 5	CLO 18	AAE0016.18
10	What is a satellite?	A satellite is an object that has been intentionally placed into orbit. These objects are called artificial satellites to distinguish them from natural satellites such as Earth's Moon.	Remember	CO 5	CLO 18	AAE0016.18

Signature of the Faculty

Dr. P K Mohanta

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