



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)  
Dundigal, Hyderabad - 500 043

**Aeronautical Engineering**

**DEFINITIONS AND TERMINOLOGY**

Course Name	:	AVIONICS AND INSTRUMENTATION
Course Code	:	AAE525
Program	:	B. Tech
Semester	:	VIII
Branch	:	Aeronautical Engineering
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Course Faculty	:	Mrs. Mary Thraza, Assistant Professor, 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
<b>UNIT-I</b>						
<b>OVERVIEW OF THE DESIGN PROCESS</b>						
1	Define inertial navigation system (ins)	An inertial navigation system (INS) is a navigation device that uses a computer, motion sensors (accelerometers) and rotation sensors (gyroscopes) and continuously calculate by dead reckoning the position, the orientation, and the velocity (direction and speed of movement) of a moving object without the need for external references	Remember	CO 1	CLO 1	AAE525.01
2	Define Accelerometer	An accelerometer is an electromechanical device used to measure acceleration forces. Such forces may be static, like the continuous force of gravity or, as is the case with many mobile devices, dynamic to sense movement or vibrations. Acceleration is the measurement of the change in velocity, or speed divided by time.	Remember	CO 1	CLO 1	AAE525.01
3	What is gyroscope	a device consisting of a wheel or disc mounted so that it can spin rapidly about an axis which is itself free to alter in direction. The orientation of the axis is not affected by tilting of the mounting, so gyroscopes can be used to provide stability or maintain a reference direction in navigation systems, automatic pilots, and stabilizers.	Understand	CO 1	CLO 1	AAE525.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
4	What is display unit	displays technology development is linked to specific military and aerospace applications, which means that ruggedized displays are suitable for applications in demanding environmental conditions.	Remember	CO 1	CLO 2	AAE525.02
5	Define Landing System.	is a system that works by sending radio waves downrange from the runway end, with aircraft that intercept it using the radio waves to guide them onto the runway.	Remember	CO 1	CLO 3	AAE525.03
6	What is Multi-function control	Unique technology based on servo-controlled proportional valve optimized for construction materials for load, stress and displacement controlled tests, with superior performances: fast reaction time, excellent sensitivity to minor variations, extremely wide oil flow rang	Remember	CO 1	CLO 3	AAE525.03
7	Define integrated modular avionics	Integrated modular avionics (IMA) are real-time computer network airborne systems. This network consists of a number of computing modules capable of supporting numerous applications of differing criticality levels.	Remember	CO 1	CLO 2	AAE525.02
8	What is task automation systems	Task automation is the use of software to reduce the manual handling of simple ... the tasks involve straightforward integration between Web-based systems.	Remember	CO 1	CLO 2	AAE525.02
9	Define active control technology	Control Technology (ACT) concepts achieve the benefits of improved mission performance and lower' cost, and the system is more integrated with digital Fly-By-Wire mechanization.	Remember	CO 1	CLO 2	AAE525.02
10	What is MEMS Gyroscope	A microelectromechanical systems (MEMS) gyroscope are miniaturized gyroscope found in electronic devices. It takes the idea of the Foucault pendulum and uses a vibrating element.	Remember	CO 1	CLO 3	AAE525.03
11	Define the term Topology	Topology is the mathematical study of the properties that are preserved through deformations, twistings, and stretchings of objects. Tearing, however, is not allowed. A circle is topologically equivalent to an ellipse	Remember	CO 1	CLO 3	AAE525.03
12	What are memory devices	Memory is any physical device capable of storing information temporarily, like RAM (random access memory), or permanently, like ROM (read-only memory). Memory devices utilize integrated circuits and are used by operating systems, software, and hardware.	Remember	CO 1	CLO 2	AAE525.02
13	Define the term avionics	Avionics are the electronic systems used on aircraft, artificial satellites, and spacecraft, in short Avionic — the	Remember	CO 1	CLO 3	AAE525.03

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		science of electronics when used in designing and making aircraft. Avionic systems include communications, navigation, the display and management of multiple systems, and the hundreds of systems that are fitted to aircraft to perform individual functions.				
14	What are Fiber Optics	Fiber optics (optical fibers) are long, thin strands of very pure glass about the diameter of a human hair. They are arranged in bundles called optical cables and used to transmit light signals over long distances.	Remember	CO 1	CLO 3	AAE525.03
15	What is avionics design	Avionics Design provides in-depth engineering for the research, design, development, fabrication and evaluation of avionics systems such as electronic control	Remember	CO 1	CLO 2	AAE525.02
16	Define Attitude Detection Indicator	he attitude indicator (AI), formerly known as the gyro horizon or artificial horizon, is a flight instrument that informs the pilot of the aircraft orientation relative to Earth's horizon, and gives an immediate indication of the smallest orientation change	Remember	CO 1	CLO 2	AAE525.02

**UNIT - II**  
**INITIAL SIZING & CONFIGURATION LAYOUT**

1	What are Flight Control Systems	A conventional fixed-wing aircraft flight control system consists of flight control surfaces, the respective cockpit controls, connecting linkages, and the necessary	Remember	CO 2	CLO 4	AAE525.04
2	What is Head Up Display	A head-up display or heads-up display, also known as a HUD (/hʌd/), is any transparent display that presents data without requiring users to look away from their usual viewpoints.	Remember	CO 2	CLO 4	AAE525.04
3	What is cockpit?	A cockpit or flight deck is the area, usually near the front of an aircraft or spacecraft, from which a pilot controls the aircraft.	Remember	CO 2	CLO 4	AAE525.04
4	What is airborne Warning	An airborne early warning and control (AEW&C) system is an airborne radar picket system designed to detect aircraft, ships and vehicles at long ranges and perform command and control of the battlespace in an air engagement by directing fighter and attack aircraft strikes.	Remember	CO 2	CLO 5	AAE525.05
5	Define Satellite Navigation	A satellite navigation or satnav system is a system that uses satellites to provide autonomous geo-spatial positioning. ... The system can be used for providing position, navigation or for tracking the position of something fitted with a receive	Remember	CO 2	CLO 5	AAE525.05
6	What is Data recorders	data logger (also datalogger or data recorder) is an electronic device that records data over time or in relation to location either with a built in instrument	Remember	CO 2	CLO 5	AAE525.05

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		or sensor or via external instruments and sensors. Increasingly, but not entirely, they are based on a digital processor (or computer)				
7	What is Traffic Collision and Avoidance System	A traffic collision avoidance system or traffic alert and collision avoidance system (both abbreviated as TCAS, and pronounced /ti:kæs/; TEE-kas) is an aircraft collision avoidance system designed to reduce the incidence of mid-air collisions between aircraft.	Understand	CO 2	CLO 5	AAE525.05
8	Define Air Data	is an essential avionics component found in modern aircraft. This computer, rather than individual instruments, can determine the calibrated airspeed, Mach number, altitude, and altitude trend data from an aircraft's pitot-static system	Remember	CO 2	CLO 5	AAE525.05
9	What is Inertial Reference Systems	The inertial reference system (IRS) provides inertial navigation data to user systems. It uses a ring laser gyro instead of the conventional rate gyro to sense angular rate about the roll, pitch and yaw axes. The system is termed strapdown since its sensors are, in effect, directly mounted to the airframe	Remember	CO 2	CLO 6	AAE525.06
10	What are Sensors?	Sensors are sophisticated devices that are frequently used to detect and respond to electrical or optical signals. A Sensor converts the physical parameter (for example: temperature, blood pressure, humidity, speed, etc.) into a signal which can be measured electrically	Remember	CO 2	CLO 6	AAE525.06
11	What is Magnetic Sensors	A MEMS magnetic field sensor is a small-scale microelectromechanical systems (MEMS) device for detecting and measuring magnetic fields	Remember	CO 2	CLO 06	AAE525.06
12	What is Air Data Probes	Our Extensive Product Line Is Used In A Wide Range Of Industries. Quality Systems. Download Brochure. Unique Solutions. Data Analysis Software. Highlights: Providing Real-Time Air And Flow Data, Using Wide Range Of Industries And Application.	Remember	CO 2	CLO 07	AAE525.07
13	What is Position Gyroscopes	can be used to determine orientation and are found in most autonomous navigation systems. For example, if you want to balance a robot, a gyroscope can be used to measure rotation from the balanced position and send corrections to a motor.	Remember	CO 2	CLO 06	AAE525.06
14	What is altimeter	An altimeter or an altitude meter is an instrument used to measure the altitude of an object above a fixed level. The measurement of altitude is called altimetry, which is related to the term bathymetry, the measurement of depth under water.	Remember	CO 2	CLO 06	AAE525.06

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
15	What is communication system	communications system or communication system is a collection of individual communications networks, transmission systems, relay stations, tributary stations, and data terminal equipment (DTE) usually capable of interconnection and interoperation to form an integrated whole.	Remember	CO 2	CLO 07	AAE525.07
<b>UNIT-III</b>						
<b>PROPULSION, FUEL SYSTEM INTEGRATION, LANDING GEAR AND BASELINE DESIGN ANALYSIS - I</b>						
1	Define a ring laser gyros?	A ring laser gyroscope (RLG) consists of a ring laser having two independent counter-propagating resonant modes over the same path; the difference in the frequencies is used to detect rotation	Remember	CO 3	CLO 09	AAE525.09
2	Define Global Positioning Systems.	The <b>Global Positioning System (GPS)</b> , originally NAVSTAR GPS, is a satellite-based radionavigation system owned by the United States government and operated by the United States Air Force. ... Obstacles such as mountains and buildings block the relatively weak GPS signals.	Remember	CO 3	CLO 09	AAE525.09
3	Define Gimbaled systems.	Most modern rockets, like the Space Shuttle and the Saturn V moon rockets, use a system called gimbaled thrust. In a gimbaled thrust system, the exhaust nozzle of the rocket can be swiveled from side to side. As the nozzle is moved, the direction of the thrust is changed relative to the center of gravity of the rocket.	Remember	CO 3	CLO 10	AAE525.10
4	Define Fuel management.	Fuel-management systems are used to maintain, control and monitor fuel consumption and stock in any type of industry that uses transport, including rail, road, water and air, as a means of business.	Understand	CO 3	CLO 10	AAE525.10
5	Define Transducer.	a device that converts variations in a physical quantity, such as pressure or brightness, into an electrical signal, or vice versa	Remember	CO 3	CLO 10	AAE525.10
6	Define tracking loop	he principal carrier tracking loop is the PLL: the aim of this carrier-phase tracking loop is to keep the phase error between the locally generated carrier	Remember	CO 3	CLO 08	AAE525.08
7	Define mechanical damper	A damper is a device that deadens, restrains, or depresses. Damper may refer to: Dashpot, a type of hydraulic or mechanical damper, Shock absorber (British or technical use: damper), a mechanical device designed to dissipate kinetic energy.	Remember	CO 3	CLO 09	AAE525.09
8	What is phasemodulator	A phase modulator is an optical modulator which can be used to control the optical phase of a laser beam.	Remember	CO 3	CLO 08	AAE525.08
9	What is radiometric	Radiometry is a set of techniques for measuring electromagnetic radiation,	Understand	CO 3	CLO 08	AAE525.08

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	sensors	including visible ... Radiometry is important in astronomy, especially radio astronomy, and plays a significant role in Earth remote sensing.				
10	Define Jamming resistance	In radio communications, jamming is defined as the intentional prevention of communication by the use of electromagnetic signals. Jamming resistance techniques provide resilience to jamming attacks when the attacker has limited transmission power and therefore cannot prevent communication on all available communication frequencies simultaneously.	Remember	CO 3	CLO 09	AAE525.09
11	Define radio frequency spectrum	The radio spectrum is the part of the electromagnetic spectrum with frequencies from 30 hertz to 300 GHz. Electromagnetic waves in this frequency range, called radio waves, are widely used in modern technology, particularly in telecommunication	Remember	CO 3	CLO 10	AAE525.10
12	What is Oceanic crossings	crossing or extending across the ocean or lying or dwelling beyond the ocean	Remember	CO 3	CLO 10	AAE525.10
13	What are inertial sensors	inertial sensors are sensors based on inertia and relevant measuring principles. These range from Micro Electro Mechanical Systems (MEMS) inertial sensors, measuring only few mm, up to ring laser gyroscopes that are high-precision devices with a size of up to 50cm.	Remember	CO 3	CLO 08	AAE525.08
14	Define Autopilot modes	An autopilot is a system used to control the trajectory of an aircraft, marine craft or spacecraft without constant manual control by a human operator being required. Autopilots do not replace human operators, but instead they assist them in controlling the vehicle. This allows them to focus on broader aspects of operations such as monitoring the trajectory, weather and systems	Remember	CO 3	CLO 9	AAE525.09
15	Define Flight Data Recorders	A flight data recorder (FDR; also ADR, for accident data recorder) is an electronic device employed to record instructions sent to any electronic systems on an aircraft. The data recorded by the FDR are used for accident and incident investigation.	Remember	CO 3	CLO10	AAE525.10
<b>UNIT-IV</b>						
<b>BASELINE DESIGN ANALYSIS - II</b>						
1	Define Protected ILS	The ILS critical area is an area of defined dimensions about the localizer and glide path antennas where vehicles, including aircraft, are excluded during all ILS operations. The critical area is protected because the presence of vehicles and/or aircraft inside its boundaries will cause unacceptable disturbance to the ILS signal-in-space	Remember	CO 4	CLO11	AAE525.11

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
2	What is Satellite Communication system	A satellite is basically a self-contained communications system with the ability to receive signals from Earth and to retransmit those signals back with the use of a transponder—an integrated receiver and transmitter of radio signals.	Remember	CO 4	CLO12	AAE525.12
3	What are marker systems	marker beacon is a particular type of VHF radio beacon used in aviation, usually in conjunction with an instrument landing system (ILS), to give pilots a means to determine position along an established route to a destination such as a runway.	Remember	CO 4	CLO12	AAE525.12
4	What is Distance Measuring Equipment	Definitions. Distance Measuring Equipment (DME) is defined as a navigation beacon, usually coupled with a VOR beacon, to enable aircraft to measure their position relative to that beacon. Aircraft send out a signal which is sent back after a fixed delay by the DME ground equipment	Remember	CO 4	CLO12	AAE525.12
5	What are Autopilot Flight Director Systems	a flight director system is an autopilot system without the servos. All of the same sensing and computations are made, but the pilot controls the airplane and makes maneuvers by following the commands displayed on the instrument panel.	Remember	CO 4	CLO11	AAE525.11
6	Define Required Navigation Performance	Required Navigation Performance (RNP) is a family of navigation specifications under Performance Based Navigation (PBN) which permit the operation of aircraft along a precise flight path with a high level of accuracy and the ability to determine aircraft position with both accuracy and integrity.	Remember	CO 4	CLO13	AAE525.13
7	Define Ground Proximity Warning system	A Ground Proximity Warning System (GPWS) is a system designed to alert pilots if their aircraft is in immediate danger of flying into the ground or an obstacle.	Remember	CO 4	CLO12	AAE525.12
8	What is FLY BY WIRE	a semi-automatic and typically computer-regulated system for controlling the flight of an aircraft or spacecraft.	Remember	CO 4	CLO11	AAE525.11
9	Define Air Traffic Management	Air traffic management (ATM) is an aviation term encompassing all systems that assist aircraft to depart from an aerodrome, transit airspace, and land at a destination aerodrome, including Air Traffic Services	Remember	CO 4	CLO11	AAE525.11
10	What is inertial reference system	The inertial reference system (IRS) provides inertial navigation data to user systems. It uses a ring laser gyro instead of the conventional rate gyro to sense angular rate about the roll, pitch and yaw axes. The system is termed strapdown since its sensors are, in effect, directly mounted to the airframe	Remember	CO 4	CLO11	AAE525.11
11	Define Terrain Awareness and Warning System	In aviation, a terrain awareness and warning system (TAWS) is generally an	Remember	CO 4	CLO13	AAE525.13

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	(TAWS)	on-board system aimed at preventing unintentional impacts with the ground, termed "controlled flight into terrain" accidents				
12	What is Reversible Flight Control System	Reversible is when there is a direct linkage from controls to control surfaces. For example the cable linkages in a light aircraft up to an MD-80. Irreversible is when there is a hydraulic power control unit in the way, it can be mechanical or fly-by-wire	Remember	CO 4	CLO12	AAE525.12
13	What are aircraft systems?	Aircraft systems is a complex system. In the design stage and in the operating process to ensure continued airworthiness of the aircraft. It is broken down into simpler sub systems that carry out homogeneous functions.	Remember	CO 4	CLO13	AAE525.13
14	What is Flight management System (FMS)	flight management system (FMS) is a fundamental component of a modern airliner's avionics. An FMS is a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators.	Remember	CO 4	CLO12	AAE525.12
15	Define Lateral Navigation	Lateral navigation refers to movement between screens at the same level of hierarchy. It enables access to different app destinations and features, or pivoting between related items in a set	Remember	CO 4	CLO13	AAE525.13
16	Define Local Area Augmentation System	The local-area augmentation system (LAAS) is an all-weather aircraft landing system based on real-time differential correction of the GPS signal. ... A receiver on an aircraft uses this information to correct GPS signals, which then provides a standard ILS-style display to use while flying a precision approach.	Remember	CO 4	CLO13	AAE525.13
<b>UNIT-V</b>						
<b>COST ESTIMATION, PARAMETRIC ANALYSIS, OPTIMISATION, REFINED SIZING AND TRADE STUDIES, PARAMETRIC ANALYSIS, OPTIMISATION, REFINED SIZING AND TRADE STUDIES</b>						
1	What is Pulse-Doppler RADAR	A pulse-Doppler radar is a radar system that determines the range to a target using pulse-timing techniques, and uses the Doppler effect of the returned signal to determine the target object's velocity.	Remember	CO 5	CLO14	AAE525.14
2	What are Data Recorder	A data logger (also datalogger or data recorder) is an electronic device that records data over time or in relation to location either with a built in instrument or sensor or via external instruments and sensors.	Remember	CO 5	CLO14	AAE525.14
3	What are Star Trackers	A star tracker is an optical device that measures the positions of stars using photocells or a camera	Remember	CO 5	CLO14	AAE525.14



S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
4	What are surveillance systems.	Surveillance systems are an essential part of securing your home or business. These systems can range from wireless home security cameras to sophisticated alarm systems that notify law enforcement at the first sign of trouble	Remember	CO 5	CLO14	AAE525.14
5	What are Integrated Modular Avionics	Integrated modular avionics (IMA) are real-time computer network airborne systems. This network consists of a number of computing modules capable of supporting numerous applications of differing criticality levels.	Remember	CO 5	CLO14	AAE525.14
6	Sewfine auto-flight system	A conventional fixed-wing aircraft flight control system consists of flight control surfaces, the ... Many aircraft have wing flaps, controlled by a switch or a mechanical lever or in some cases are fully automatic by computer control	Remember	CO 5	CLO14	AAE525.14
7	What is black box	In science, computing, and engineering, a black box is a device, system or object which can be viewed in terms of its inputs and outputs (or transfer characteristics), without any knowledge of its internal workings. Its implementation is "opaque" (black).	Remember	CO 5	CLO14	AAE525.14
8	Define aircraft attitude	aircraft attitude (plural aircraft attitudes) (aviation) The orientation of an aircraft with respect to the horizon.	Remember	CO 5	CLO14	AAE525.14
9	What is Digital control	Digital control is a branch of control theory that uses digital computers to act as system controllers. Depending on the requirements, a digital control system can take the form of a microcontroller to an ASIC to a standard desktop computer.	Remember	CO 5	CLO15	AAE525.15
10	Define SAS (Stability Augmentation System)	Stability augmentation systems (SAS) were the first feedback control system designs intended to improve dynamic stability characteristics of an aircraft.	Remember	CO 5	CLO15	AAE525.15
11	What is onboard crew	Organisations that provide crew management services are known as crew management companies, or crewing managers, as commissioned by ship owners, ship managers, ship operators or charterers under a crew management contract	Remember	CO 5	CLO15	AAE525.15
12	Define Magnetic Anomaly Detector	A magnetic anomaly detector (MAD) is an instrument used to detect minute variations in the Earth's magnetic field. The term refers specifically to magnetometers used by military forces to detect submarines (a mass of ferromagnetic material creates a detectable disturbance in the magnetic field); military MAD equipment is a descendant of geomagnetic survey	Remember	CO 5	CLO15	AAE525.15
13	Define wind shear warning systems.	Wind shear warning systems essentially augment the pitot-static system with a radar altimeter and/or GPS. The system	Remember	CO 5	CLO15	AAE525.15

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		bounces radar waves off the ground beneath it to get a true AGL altitude				
14	Define SLAR (Sideways looking Aperture Radar)	LAR) is an aircraft- or satellite-mounted imaging radar pointing perpendicular to the direction of flight (hence side-looking). A squinted (nonperpendicular) mode is possible also. SLAR can be fitted with a standard antenna (real aperture radar) or an antenna using synthetic aperture	Remember	CO 5	CLO15	AAE525.15
15	What is Digital Signal Processing	Digital signal processing (DSP) is the use of digital processing, such as by computers or more specialized digital signal processors, to perform a wide variety of signal processing operations.	Remember	CO 5	CLO15	AAE525.15

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