



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500043

AERONAUTICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	AVIONICS AND INSTRUMENTS & SYSTEMS
Course Code	:	A82129
Class	:	IV .B Tech II Semester
Branch	:	Aeronautical Engineering
Year	:	2018-2019
Course Coordinator	:	Ms. M. Mary Thraza, Assistant Professor, Department of Aeronautical Engineering.
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OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of the accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating the philosophy of outcome-based education in the process of problem-solving and career development. So, all students of the institute should understand the depth and approach, of course, to be taught through this question bank, which will enhance learner's learning process.

SNo	QUESTION	Blooms taxonomy level	Course Outcomes
UNIT - I			
AVIONICS-INTRODUCTION-AVIONICS STANDARDS			
Part - A (Short Answer Questions)			
1	Write a short note on Integrated Navigation?	Understand	1
2	Define Accelerometers?	Remember	1
3	What are gyroscopes?	Understand	1
4	Write a short note on Evolution of Electronics in Aviation Industry?	Remember	1
5	What are the RNPs for various phases of flight?	Understand	1
6	Discuss the principle of operation of a Ring laser gyroscope?	Remember	1
7	Write a short note on integrated modular avionics?	Understand	2
8	Interpret Precision for RNAV?	Remember	2
9	Define Protected Instrument Landing System.	Understand	2
10	Determine the Requirements of avionics equipment and systems?	Remember	2
Part - B (Long Answer Questions)			

1	Explain short notes on the avionic packaging.	Understand	1
2	Elaborate ATR and mention its dimensions.	Understand	1
3	Describe the three types of digital data transmissions.	Remember	2
4	Write a short note on Multi-function control and display unit	Understand	2
5	Demonstrate briefly about the concept of integrated modular avionics	Remember	2
6	Elaborate a short note on task automation systems.	Understand	2
7	What do you mean by active control technology? Give at least three examples?	Remember	2
8	Discuss in brief about 'Electronic flight instrument systems'	Understand	2
9	Explain about 'Position gyroscopes'	Remember	2
10	Write in brief about 'Semi smart display architecture'.	Understand	2
Part - C (Problem Solving and Critical Thinking Questions)			
1	Write in brief about. a) Doppler Radar. b) Weather Radar.	Remember	2
2	Explain the integration of a typical Attitude Detection Indicator to the Flight display	Understand	2
3	Elaborate about Electrical and optical data bus systems.	Remember	2
4	List out different data buses presently using in aircrafts with their applications.	Understand	2
5	Describe the architecture of A-529 data buss with neat sketch indicating word format and its applications	Remember	2
6	What is DataBus? Justify its need for an avionics system.	Remember	2
7	Describe the typical driver for avionics design	Understand	2
8	Elaborate the integration of a typical Attitude Detection Indicator to the Flight display.	Remember	2
9	Explain the primary flight display about A320 with neat sketches	Understand	2
10	Interpret in detail about Airworthiness regulations?	Remember	2
UNIT - II			
DISPLAYS- MAN MACHINE INTERACTION AND COMMUNICATION SYSTEMS			
Part – A (Short Answer Questions)			
1	Define Flight Control Systems	Understand	3
2	Write the drawbacks of Microwave landing system	Remember	3
3	Summarize Head Up Display.	Remember	3
4	Write short note on military cockpit.	Remember	3
5	Discuss the principle of operation of a Ring laser gyroscope	Remember	3
6	What are the advantages of Microwave landing system	Understand	3
7	Interpret Equation for measurement of airspeed in compressible supersonic flow?	Understand	3
8	Explain Airborne Warning and Control System	Remember	3
9	Define Satellite Navigation	Understand	2
10	Write a short note on Data recorders.	Remember	2
Part - B (Long Answer Questions)			
1	What are the important units in Sattilitecommunication system? Explain the function of each.	Understand	3

2	List out the different types of modes of operation of Air Traffic Control, and briefly narrate each mode.	Remember	4
3	Discuss Aircraft Communications Addressing And Reporting System and its features.	Understand	4
4	How Traffic Collision and Avoidance System helps the aircraft? Explain briefly.	Remember	4
5	Explain the role of VOR (VHF Omni Range) in aircraft navigation	Remember	3
6	Interpret briefly block diagram the working of Satellite communication system and its applications	Understand	3
7	List out the different Navigation aids and their frequency band of operation.	Remember	4
8	Elaborate the purpose of Air Traffic Control transponder and its operation.	Remember	4
9	Infer the advantages of Inertial Navigation systems?	Understand	3
10	What do you understand by Air Data and Inertial Reference Systems (ADIRS)	Remember	4
Part – C (Problem Solving and Critical Thinking)			
1	Elaborate the basic principle of VHF signal propagation.	Understand	2
2	Infer the modulation? Discuss any two types of modulation in a communication system.	Remember	4
3	Discuss the basic principle of VHF communication and draw the block diagram of VHF Transmitter.	Remember	4
4	Explain about Audio integrating system-AIS (INTERCOM) of a civil aircraft.	Understand	4
5	Describe the principle of HF communication with suitable diagrams	Remember	4
6	Explain the working principles of powered flight control systems.	Remember	4
7	What is a data Link? How it supplements communication system in HF & VHF.	Understand	4
8	Illustrate the facility of SELCAL.	Remember	4
9	Discuss the categorization of radio frequency indicating frequency band, name, and frequency.	Remember	4
10	Elaborate the Transponder Landing System (TLS).	Understand	4
UNIT-III			
INERTIAL SENSORS AND GLOBAL POSITIONING SYSTEMS			
Part - A (Short Answer Questions)			
1	Define are ring laser gyros?	Understand	5
2	Write a short note on Global Navigational satellite systems?	Remember	5
3	Infer the optical gyroscopes?	Remember	5
4	What are angular momentum gyros?	Understand	3
5	Define Global Positioning Systems.	Remember	5
6	Name the different types of GPS receivers.	Remember	5
7	List out Long Range Navigation systems?	Understand	5
8	Identify the limitations of Autopilot system?	Remember	2
9	State the advantages of Autopilot system.	Understand	5
10	Write a short note on Autopilot speed control?	Remember	5

11	Explain about FBW control system?	Remember	2
12	What are Carefreemaneuvering characteristics?	Understand	5
13	Define Fuel management.	Understand	5
14	What are the main characteristics of touch screen?	Remember	2
15	Infer the Speech template duration?	Remember	5
16	Define Syntax nodes.	Understand	2
17	What is the function of inertial sensor systems?	Understand	2
18	Infer the various inertial sensor systems used in aircraft?	Remember	2
19	Define Gimballed systems.	Remember	2
20	What is ground mapping?	Understand	2
21	What are the different methods of navigation?	Remember	2
22	Define Barometric inertial navigation.	Understand	2
23	Explain about frequency beacons.	Remember	2
24	What is Multiple-sensor navigation?	Remember	2
MID- II			
1	Explain vulnerability of Avionics system.	Understand	5
2	Infer Dead reckoning type of navigation.	Understand	5
3	Explain and expand CERVIT.	Remember	5
4	Define piezo-electric transducer.	Remember	5
5	What is Langmuir flow?	Understand	5
6	What is Interferometric type of FOG?	Understand	5
7	Define Fibre Optic Gyro.	Remember	5
8	What is Sagnac phase shift?	Understand	5
9	Define metal magnetic screening.	Understand	5
10	Explain servo amplifier?	Remember	5
11	What are the non-reciprocal phase transducers?	Understand	5
12	Define digital demodulation.	Understand	2
13	What is phasemodulator?	Remember	5
14	Explain Ephemeris parameters.	Remember	5
15	What is mechanical damper?	Understand	2
16	Define code tracking loop.	Remember	5
17	Explain Terrain contour navigation.	Understand	5
18	What is Terrain characteristic matching?	Understand	5
19	Define Scene matching area correlation.	Remember	5
20	What are radiometric sensors?	Understand	5
21	Explainabout Wide area augmentation system.	Remember	5
22	Define multi-path error.	Remember	5
23	What is Antenna obscuration?	Remember	5
24	Infer the Jamming resistance.	Remember	5

Part – B (Long Answer Questions)			
1	Explain satellite navigation in the global positioning system?	Understand	5
2	Illustrate the working of Oceanic crossings in inertial sensors and global positioning systems	Remember	5
3	Write in detail about the basic navigation parameters in inertial sensors and global positioning systems.	Remember	5
4	What do you understand by stable platform Systems and explain in detail.	Understand	4
5	Discuss the strap down systems in inertial sensors and global positioning systems	Understand	5
6	Illustrate the differential GPS (global positioning systems).	Remember	5
7	Illustrate the short notes on the Class A and Class B of GPS (global positioning systems) receivers.	Remember	4
8	Write short notes on Flight Data Recorders and explain in detail.	Understand	5
9	Differentiate the different Autopilot modes in inertial sensors and global positioning systems.	Remember	4
10	Interpret the Radio Navigation in inertial sensors and global positioning systems.	Remember	5
Part – C (Problem Solving and Critical Thinking)			
1	Explain Transponder Landing System (TLS) in inertial sensors and global positioning systems.	Understand	5
2	Discuss VHF Omni directional radio range in inertial sensors and global positioning systems.	Remember	5
3	Draw a neat sketch and list out the locations of antenna locations on a Boeing 999.	Remember	5
4	Interpret microwave landing system in inertial sensors and global positioning systems.	Understand	5
5	Explain in detail about Localizer in inertial sensors and global positioning systems.	Remember	5
6	Illustrate in detail about Radiofrequency Spectrum in inertial sensors and global positioning systems.	Remember	5
7	Draw a neat sketch and list out the locations of antenna locations on a Boeing 939.	Understand	5
8	Explain Automatics Direction Finding in inertial sensors and global positioning systems.	Remember	5
9	Illustrate Fly-By-Wire system? Explain Boeing implementation in inertial sensors and global positioning systems.	Remember	5
10	Differentiate the advantages and disadvantages of digital control in global positioning system?	Understand	9
UNIT-IV			
NAVIGATION, RANGING AND LANDING SYSTEMS			
Part – A (Short Answer Questions)			
1	What do you understand by Differential GPS?	Understand	9
2	Define Protected ILS.	Remember	9
3	List out automatic direction finders.	Remember	5
4	Infer Inertial Navigation System.	Understand	9
5	What are marker systems?	Remember	9
6	Define Radio Detection And Ranging.	Remember	9

7	Define Satellite Communication system.	Understand	5
8	Differentiate the localizer and glide slope.	Remember	9
9	Infer Local Area Augmentation System.	Remember	4
10	Define Distance Measuring Equipment.	Understand	9
Part – B (Long Answer Questions)			
1	Explain the Pitch –Attitude Hold in navigation, ranging and landing systems.	Understand	9
2	Differentiate the Local Area Augmentation System and Satellite Communication system.	Remember	11
3	Illustrate briefly about the Autoland in aircraft systems.	Remember	9
4	Discuss the appearance of normal shock when the aircraft is in flight condition?	Understand	11
5	Illustrate Autopilot yaw control in aircraft systems.	Remember	9
6	Interpret the Autopilot Flight Director Systems (AFDS) in aircraft systems.	Remember	9
7	Explain the Lateral Navigation in the navigation system.	Understand	9
8	Demonstrate the HF data link in navigation, ranging and landing systems?	Remember	9
9	Elaborate the Required Navigation Performance (RNP) in the navigation system.	Remember	11
10	Differentiate the High – Frequency Data Link (HFDL) with Lateral Navigation in the navigation system.	Understand	9
Part – C (Problem Solving and Critical Thinking)			
1	Explain in detail about the ‘Flight Control Reference Planes’.	Understand	9
2	Illustrate the Ground Proximity Warning system (GPW) in avionic system.	Remember	11
3	Discuss in detail about Reversible Flight Control System in aircraft systems?	Remember	11
4	Explain the Airbus model of FBW (FLY BY WIRE) system in detail.	Understand	9
5	Interpret in detail about the Irreversible Flight Control system in navigation, ranging and landing systems?	Remember	11
6	Explain how the flight control and monitoring are fulfilled?	Remember	9
7	Illustrate in detail about Terrain Awareness and Warning System (TAWS)	Understand	9
8	Differentiate the objectives of Air Traffic Management in navigation, ranging and landing systems?	Remember	9
9	Demonstrate about the elements of improvement in Navigation systems.	Remember	9
10	Explain in detail about RNAV standards in navigation system.	Understand	9
UNIT-V			
SURVEILLANCE SYSTEMS AND AUTOFLIGHT SYSTEMS			
Part - A (Short Answer Questions)			
1	Elaborate SLAR (Sideways looking Aperture Radar)	Understand	9
2	Define weather radar systems.	Remember	9
3	What do you understand by Digital Signal Processing?	Remember	9
4	Define Satellite landing guidance system.	Understand	11

5	Write a short note on Multi-function control and a display unit.	Remember	9
6	Define Mode S transponders.	Remember	9
7	Infer predictive wind shear warning systems.	Understand	9
8	Elaborate ECM (Electronic Counter Measures)	Remember	9
9	Define Magnetic Anomaly Detector.	Remember	9
10	Infer Flight Management systems	Understand	9
Part - B (Long Answer Questions)			
1	Explain briefly about TACAN (tactical air navigation) in navigation systems for military aircraft.	Remember	11
2	What were the problems faced by the onboard crew of a military aircraft from on the aspect of Communication?	Understand	11
3	Demonstrate the Generic interface between avionics and mission systems with block diagram.	Remember	9
4	Illustrate in brief about Navigation and guidance system and differ in between them.	Remember	11
5	Write in brief about the application of Reaction wheels in Stability of an aircraft.	Understand	9
6	Interpret the horizon sensors in surveillance systems.	Remember	11
7	Explain how modern design techniques help in designing SAS (Stability Augmentation System) as well as autopilots.	Remember	9
8	Differentiate the command and telemetry systems in surveillance systems.	Understand	11
9	Explain briefly about magnetometers used in surveillance systems and auto-flight systems.	Remember	9
10	Demonstrate the concept of Digital control in surveillance systems and auto-flight systems.	Remember	11
Part – C (Problem Solving and Critical Thinking)			
1	With the help of neat sketches explain Primary power distribution in aircraft systems?	Understand	9
2	Discuss the needs of air-to-air refueling for military aircraft in surveillance systems and auto-flight systems.	Remember	11
3	Explain Electronic Warfare support measures in surveillance systems and auto-flight systems.	Understand	9
4	Differentiate the navigation requirement between civil and military aviation.	Remember	9
5	Explain about ILS coupled autopilot control system in aircraft landing system.	Remember	9
6	Illustrate the Integrated Modular Avionics in surveillance systems and auto-flight systems.	Understand	11
7	Explain the functioning of Pulse-Doppler RADAR in surveillance systems and auto-flight systems.	Remember	9
8	Demonstrate the principle and operation of Star Trackers in surveillance systems.	Remember	11
9	Differentiate the different types of sensors used in spacecraft and aircraft.	Understand	9
10	Explain the functioning of Forward-Looking RADAR and differentiate with Pulse-Doppler RADAR.	Remember	9