

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BRANCH NAME: Aeronautical Engineering**  
**SUBJECT NAME: Advanced Avionics**  
**SUBJECT CODE: 2170105**  
**B.E. 7<sup>th</sup> SEMESTER**

**Type of course:** Engineering Science

**Prerequisite:** Basics of Avionics and Electronics.

**Rationale:** Advanced Avionics is one of the core areas in the field of aviation. The concepts of Advanced Avionics are vitally important to design any aircraft's cockpit and control system.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
				PA	ALA	ESE	OEP			
4	0	2	6	70	20	10	20	10	20	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
1	<b>Advanced Avionics System:</b> <ul style="list-style-type: none"><li>Enhanced GPWS</li><li>IRNSS</li><li>Microwave landing system</li><li>Multifunction Display</li></ul>	5	15%
2	<b>HF Communication</b> <ul style="list-style-type: none"><li>HF range and propagation</li><li>SSB modulation</li><li>Selective calling (SELCAL)</li><li>HF radio equipment</li></ul>	6	10%
3	<b>Inertial systems:</b> <ul style="list-style-type: none"><li>Inertial guidance system</li><li>Inertial navigation system</li></ul>	5	10%
4	<b>Emergency Locator Transmitter (ELT)</b> <ul style="list-style-type: none"><li>Types of ELT</li><li>Maintenance and testing of ELT</li><li>ELT mounting requirements</li><li>Typical ELT</li></ul>	6	10%
5	<b>Defining The Avionics Systems Requirements-1, Designing Aircraft and its mission drive the avionics system design. Maintenance by Who, When, Where, Fault tolerant software,</b>	8	20%

	Evaluating systems designs, Keeping avionics cool		
6	<b>Making Maintenance Easier</b> Designing for easy maintenance, BITE and CFDS are big helps Automatic test equipment speeds maintenance, ATLAS: a giant of a test language	5	15%
7	Electronic Flight Instrument system(EFIS) Autopilot Flight director system Flight Management system Flight Data and cockpit voice Recorder	7	20%

**Suggested Specification table with Marks (Theory):**

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
35%	25%	20%	15%	5%	0%

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Books:**

1. Aircraft communication and navigation systems by Mike Tooley and David Wyatte
2. Digital Avionics Systems by C R Spitzer
3. Avionics Handbook compiled by C R Spitzer
4. Principles of Avionics by Albert Helfrick
5. Avionics Systems by D H Middleton

**Course Outcome:**

After learning the course the students should be able to:

- To know about the basic fundamentals of Avionics systems
- To understand the basic working principle of Avionics system
- To know about the maintenance of Avionics system and its purpose.

**List of Experiments:**

1. Introduction of IRNSS (Indian Regional navigation Satellite System).
2. To study EGPWS (Enhanced Ground Proximity System)
3. To study about Multifunction display.
4. To study about servo motors.
5. To study EFIS (Electronic flight instrument system).
6. To study Aircraft mode in Radio control system.
7. To study Helicopter mode in Radio control system.
8. To study Channel mixing in radio control system.

**9. To study about SELCAL.**

**10. To study about Emergency locator transmitter.**

**Design based Problems (DP)/Open Ended Problem:**

Apart from above experiments a group of students has to undertake one open ended problem/design problem.

Few examples of the same are given below.

1. Make a chart of IRNSS.
2. Make a colored chart of multifunction display.

**Major Equipment: Digital avionics system, IRNSS, maintenance of avionics system**

**List of Open Source Software/learning website:** <http://nptel.iitm.ac.in/courses.php>

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.