

## 4/4 B.Tech EIGHT SEMESTER

EC8T4B

Introduction to Avionics

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

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**Prerequisites:** Switching Theory & Logic Design (EC3T6)

### Course Objectives:

- To introduce role of avionics system and its architecture
- To understand the trends in display technology
- To understand the avionics system design development and integration using simulation tools
- To know modular avionics packaging and EMI/EMC requirements in avionics
- To study system assessment, validation, certification and maintenance of avionics

### Learning Outcomes:

The student will be able to:

- Conceptualize systems and subsystems of avionics.
- Analyse trends in display technology
- Estimate life cycle costs for military and civil avionics
- Perform system assessment, validation, certification and maintenance of avionics system

### UNIT- I

**Overview:** Role for Avionics in Civil and Military Aircraft systems, Avionics sub-systems and design, defining avionics System/subsystem requirements, Avionics system architectures

### UNIT –II

**AVIONICS SYSTEM ESSENTIALS: DISPLAYS, I/O DEVICES AND POWER:** Trends in display technology, Alphanumeric displays, character displays etc., Civil and Military aircraft cockpits, MFDs, MFK, HUD, HDD, HMD, DVI, HOTAS, Synthetic and enhanced vision, situation awareness, Panoramic/big picture display, virtual cockpit-Civil and Military Electrical Power requirement standards, comparing the Military and Civil Requirements and Tips for Power System Design

### UNIT- III

**AVIONICS SYSTEM DATA BUSES, DESIGN AND INTEGRATION :**MIL-STD-1553B, ARINC-429, ARINC-629, CSDB, AFDX and its Elements, Avionics system design, Development and integration-Use of simulation tools, standalone and integrated Verification and Validation

#### **UNIT- IV**

**PACKAGING AND EMI/EMC :**Modular Avionics Packaging, Trade-off studies, ARINC and DOD types, system cooling, EMI/EMC requirements BIT and CFDS, Automatic Test Equipment, Speeds maintenance, ATLAS, Remote diagnostics and maintenance support-Life Cycle Costs for Military and Civil Avionics, Cash flow analysis

#### **UNIT-V**

**SYSTEM ASSESSMENT, VALIDATION AND CERTIFICATION:** certification requirements-Fault Tree analysis –Failure mode and effects analysis, Criticality and damaging modes and effects analysis, Software development process models, Software Assessment and Validation -Civil and Military standards, Certification of Civil Avionics. Fault tolerant systems and Hardware and Software, Evaluating system design and Future architecture Hardware assessment-FARs guide certification

### **Learning Resources**

#### **Text Books:**

1. Collinson R.P.G. ‘Introduction to Avionics’, Chapman and Hall, 1996
2. Cary R .Spitzer, The Avionics Handbook, Crc Press, 2000

#### **References:**

1. Spitzer, C.R. ‘Digital Avionics Systems’, Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987
2. Middleton, D.H. ‘Avionics Systems’, Longman Scientific and Technical, Longman Group UK Ltd., England, 1989
3. Jim Curren, Trend in Advanced Avionics, IOWA State University, 1992.

#### **Web Resources:**

1. [www.flightsafety.com/elearning](http://www.flightsafety.com/elearning)