

## 4/4 B.Tech - EIGHTH SEMESTER

EC 8T3B

Aircraft Navigation Systems

Credits: 4

Lecture : 4 periods/week

Tutorial: 1 period /week

Internal assessment: 30 marks

Semester end examination: 70 marks

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### Course Objectives:

- Learning about radio spectrum, testing of Emergency locator transmitters
- Learning about navigation systems and developments
- Learning about filters like kalman filter and principles of navigation systems
- Learning about principles of air traffic control systems

### Learning Outcomes:

- Analysed principle of Radio spectrum and tested different transmitter structures
- Various types of navigation systems studied and learned development of different filters in air crafts

### UNIT-I

**Introduction:** The radio frequency spectrum, Electromagnetic waves, Frequency and , wavelength, The atmosphere, Radio wave propagation, The ionosphere, MUF and LUF.

### UNIT-II

**Flight-deck audio systems:** Flight interphone system, Cockpit voice recorder, Emergency locator transmitters: Types of ELT, Maintenance and testing of ELT, ELT mounting requirements, Typical ELT, Cospas–Sarsat satellites.

### UNIT-III

**Aircraft navigation:** The earth and navigation, Dead reckoning, Position fixing, Maps and charts, Navigation terminology, Navigation systems, development.

### UNIT-IV

**Automatic direction finder:** Introducing ADF, ADF principles, ADF equipment, and Operational aspects of ADF.

**Doppler navigation:** The Doppler effect, Doppler navigation principles, Airborne equipment overview, Typical Doppler installations, Other Doppler applications

### UNIT-V

**Area navigation:** RNAV overview, RNAV equipment, Kalman filters, Required navigation performance.

### UNIT-VI

**Inertial navigation systems:** Inertial navigation principles, System overview, System description, Alignment process, Inertial navigation accuracy.

## **UNIT-VII**

**Global navigation satellite system:** GPS overview, Principles of wave propagation, Satellite navigation principles, GPS segments, GPS signals, GPS operation, Other GNSS, The future of GNSS.

## **UNIT-VIII**

**Air traffic control system:** ATC overview, ATC transponder modes, airborne equipment, System operation, and Automatic dependent surveillance-broadcast, Communications, navigation and surveillance/air traffic management.

### **Learning Resources**

#### **Text Books:**

1. Aircraft Communications and Navigation Systems- Jeremy M. Pratt, Taylor & Francis,2007
2. The future air navigation system- Vincent P.Galotti. 1997

#### **References:**

1. Aircraft Power Plants, Mekinley, J.L. and Bent, R.D., McGraw-Hill, 1993.
2. Aircraft Instruments & Principles, Pallet, E.H.J., Pitman & Co., 1993.