

**COURSE TITLE : AIRCRAFT INSTRUMENTS**  
**COURSE CODE : 6214**  
**COURSE CATEGORY: E**  
**PERIODS/WEEK : 5**  
**PERIODS/SEMESTER: 75**  
**CREDITS : 5**

**TIME SCHEDULE**

Module	Topics	Periods
1	Requirements of Air craft Instruments and types of Displays	17
2	Pitot static flight Instruments	18
3	Gyro Instruments	20
4	Sensors used in Aircrafts	20
<b>Total</b>		<b>75</b>

**COURSE OUTCOME**

MODULE	G.O.	On completion of the study of this module the student will be able
1	1	To Understand Basic Requirements of Air Craft Instruments-Location, Visibility and Grouping
	2	To know different Types of Displays in Air Craft
2	1	To understand Pitot static flight Instruments
3	1	To know Gyro Instruments
4	1	To understand Temperature sensors used in air crafts
	2	To know direct reading Pressure gauges.
	3	To understand fuel quantity measurement methods in air craft.
	4	To know the importance of flight data recording.

On Completion of the study the student will be able

**MODULE I REQUIREMENTS OF AIR CRAFT INSTRUMENTS AND TYPES OF DISPLAYS**

**1.1.0 Understand Basic Requirements of Air Craft Instruments-Location,Visibility and Grouping**

- 1.1.1 To list the flight and Navigation Instruments.
- 1.1.2 To explain Lever Mechanism.
- 1.1.3 To describe Gear Mechanism in Indicating Instruments.
- 1.1.4 To explain how hair springs are used for controlling applications in Instruments.
- 1.1.5 To illustrate temperature compensation using Bimetal strips in Measuring Instruments.

### **1.2.0 Understand Types of Displays in Air Craft**

- 1.2.1 To classify Quantitative displays such as Circular Scale-Linear and Non Linear scale displays-High range long scale displays.
- 1.2.2 To explain Straight scale display
- 1.2.3 To describe Digital display-Dual Indicator-Coloured Display –Direct display-Headup display
- 1.2.4 To Explain LED and LCD Display.

## **MODULE II PITOT STATIC FLIGHT INSTRUMENTS**

### **2.1.0 Understand Pitot static flight Instruments.**

- 2.1.1 To explain Pitot Pressure
- 2.1.2 To describe the sensing and transmission of Pitot pressure and Static Pressure.
- 2.1.3 To explain construction of pitot static Probe used in air craft instruments
- 2.1.4 To describe the heating circuit arrangement in pitot tube.
- 2.1.5 To describe the working of Aneroid Barometer and Altimeter.
- 2.1.6 To explain the working of Air speed Indicator.
- 2.1.7 To define Mach Number
- 2.1.8 To explain the working of Mach meter.
- 2.1.9 To explain the working of Vertical Speed Indicator

## **MODULE III GYRO INSTRUMENTS**

### **3.1.0 Understand Gyro Instruments**

- 3.1.1 To explain altitude Indication.
- 3.1.2 To define Pitch ,Bank and Turn
- 3.1.3 To describe the fundamental properties of Gyroscope.
- 3.1.4 To define the degrees of freedom of Gyroscope
- 3.1.5 To explain pneumatic and electric method of driving Gyroscope rotor.
- 3.1.6 To explain Gyro Horizon.
- 3.1.7 To describe the principle of gyrohorizon.
- 3.1.8 To explain the working principle of Electrically operated Engine speed Indicator.
- 3.1.9 To explain Tacho probe and Indicator System.

## **MODULE IV SENSORS USED IN AIR CRAFTS**

### **4.1.0 Understand Temperature sensors used in air crafts**

- 4.1.1 To list the different types of Temperature sensors used in air craft's.
- 4.1.2 To describe the surface contact type and immersion type thermocouples
- 4.1.3 To explain working of Radiation Pyrometer for exhaust gas temperature measurement.

### **4.2.0 Understand direct reading Pressure gauges.**

- 4.2.1 To explain Inductor Pressure Transmitter.
- 4.2.2 To explain the working of Pressure switches.

### **4.3.0 Understand fuel quantity measurement methods in air craft.**

- 4.3.1 To explain the working of Capacitance type Fuel gauge system used in air crafts.

### **4.4.0 Understand the importance of flight data recording.**

- 4.4.1 To list the mandatory parameters recorded .
- 4.4.2 To explain the working principle of Accelerometer.
- 4.4.3 To explain trace recording and electromagnetic recording.

## **CONTENT DETAILS**

### **MODULE I**

Flight and Navigation Instruments- Lever Mechanism- Gear Mechanism in Indicating Instruments- temperature compensation using Bimetal strips in Measuring Instruments- Types of Displays in Air Craft- Quantitative displays - Circular Scale-Linear and Non Linear scale displays-High range long scale displays- Straight scale display- Digital display-Dual Indicator-Coloured Display –Direct display-Headup display -LED and LCD Display.

### **MODULE II**

Pitot static flight Instruments- Pitot Pressure- sensing and transmission of Pitot pressure and Static Pressure- pitot static Probe -heating circuit arrangement in pitot tube- Aneroid Barometer and altimeter. Air speed Indicator- Mach Number- Mach meter- Vertical Speed Indicator

### **MODULE III**

Gyro Instruments - altitude Indication- Pitch ,Bank and Turn- Gyroscope-degrees of freedom of Gyroscope- pneumatic and electric method of driving Gyroscope rotor- Gyro Horizon- principle of gyrohorizon- Electrically operated Engine speed Indicator- Tacho probe and Indicator System.

### **MODULE IV**

Temperature sensors used in air - surface contact type and immersion type thermocouples -Radiation Pyrometer for exhaust gas temperature measurement- direct reading Pressure gauges- Inductor Pressure Transmitter- Pressure switches- fuel quantity measurement methods in air craft- Capacitance type Fuel gauge system used in air crafts.-flight data recording- - the mandatory parameters recorded - Accelerometer - trace recording and electromagnetic recording.

### **REFERENCES**

1. E H J Pallett -Aircraft Instruments–Principles and Applications- Pitman Publishing Inc
2. E O Doebelin -Measurement system- - TMH
3. Max.F.Henderson - Aircraft Instruments and Avionics-.Publisher Jeppesen
4. C.A.Williams -Aircraft Instruments-Sterling Book Hous