

AIRCRAFT INSTRUMENTATION

DETAILED SYLLABUS

OBJECTIVES

It aims at enabling the student to understand Different type of instruments used in aircraft

UNIT- I INTRODUCTION TO AIRCRAFT INSTRUMENTATION SYSTEMS

Introduction to Aircraft Instrumentation systems and Aircraft- Requirements of Aircraft Instrumentation System, Temperature, Humidity- High gravity Forces ,Vibration Accuracy, Sensitivity Reliability ,Maintainability Size, Weight Cost FAIL SURE and FAIL SAFE FEATURES Remote indication and Control. Instrument Panels and Cockpit Layouts Grouping of Instruments, Flight Instruments – Basic “SIX” & BASIC “T” ,Power Plant Instruments, basic pitot system of aircraft

UNIT- II DISPLAYS AND TYPES OF COCKPIT DISPLAYS

Priority Consideration, Reference frame consideration Basic Display Radial Displays, Characteristics of Radial Displays., Digital Displays Characteristics of Digital Display, Vertical Displays., Characteristics of Vertical Display Head up Display (H.U.D) – Basic HUD system, important components H U D System, Characteristics of HUD system .,Other Types of cockpit Displays:, Recorded Displays, Audio Displays ,Illuminated Displays, Head Down Display – HDD Projected Map Display – PMD Horizontal Situation Indicator – HSI, Helmet Mounted Display, Integrated Displays Instrument Elements – Explanations of four principal elements of an instrument system with diagrams .Instrument Mechanisms, gears, Hair Springs, Bimetal Strip method

UNT- III AIR DATA BASED INSTRUMENT

Basic theory of operation of an Altimeter Pressure altitude and indicated altitude ‘Q’ Codes and their purpose Servo controlled altimeter –advantages Airspeed indicator- Introduction, purpose Air speed terminology and Air speed terminology diagram Principle of operation of Air speed indicator Square law compensation for air speed indicator Introduction to ROCI and its purpose Principle of operation of ROCI Operation of ROCI for climb, level and dive conditions of an aircraft Metering unit in an ROCI and its purpose

UNIT- IV GYRO BASED INSTRUMENT

Introduction to gyroscope and its application in aircraft Gyroscope and its properties: Rigidity Precession Three degrees of freedom of a gyroscope Gyroscopic references Limitations of a free gyroscope Limitations of a displacement gyroscope Modern trends: LASER gyroscope Introduction to AH Gyro horizon principles Electric gyro horizon Introduction to TBI its purpose in an aircraft Rate gyroscope and its operation Bank indications on dial for various conditions of flight of aircraft Indication of turn and slip on dial of TBI indicator Introduction and purpose Magnetic Reference Heading System (MHRS) Working principle of an aircraft heading system

UNIT- V RADIO INDICATING COMPASS

Introduction to DI/RI Compass Basic principle of operation Radio magnetic indicator (RMI)

UNIT- VI MACHMETER

Introduction to mach meter, purpose and need for mach meter in an aircraft Principle of operation of mach meter

TEXT BOOKS

1. Aircraft Instrument systems by EHJ Pallet
2. Aircraft Systems volume IV by Lalit Gupta and Dr OP Sharma

REFERENCES

Aircraft electrical systems by JOHN KENNEDY