AMITY UNIVERSITY
UTTAR PRADESH

Course Title : Avionics Sensors & Instruments
Course Level : PG
Course Code : SPAC603

Credit Units : 05

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3	1	2	0	05

Course Objectives:

Knowledge of Sensors and Instruments in any engineering branch is vital in designing and industrial production/application. The course covers the characteristics and classifications of sensors, instruments and measurement related to aerospace systems and industry.

Pre-requisites:

- Aerospace electronics
- Basic Electrical Engg.

Course Contents/Syllabus:

	Weightage (%)
Module I : Introduction	**15**
Elements of generalized measurement system; Basic characteristics of measuring instruments: Accuracy, Precision, Sensitivity, Resolution & Linearity; Errors in measurements; Statistical treatment of data. Measure of central tendency and dispersion. Normal distribution and standard distribution curves and applications	
Module II : Transducers	**20**
Resistive Transducers, resistive pressure & position transducers; Inductive Transducers: LVDT; Strain Gauge. Derivation of gauge factor; Types of strain gauges; Derivation of output on WS bridge: Null type & deflection type bridges; Rosettes; Piezoelectric transducers & Photo electric transducers Air-data sensor, static air pressure and temperature, gyroscope: rate gyro and digital compass, vibration sensor, rotational speed sensor.	

Module III: Measurement of Resistance, Inductance & Capacitance	**50**
. DC bridges: Wheat Stone's bridge and its sensitivity & limitations; Kelvin double bridge. AC Bridges: General form; Inductance Measurement: Maxwell bridge & Anderson's bridge; Capacitance Measurement: Schering Bridge & De-Sauty's bridge.	
Module IV: Applications & Display Devices.	**15**
Capillary tube viscometer & Rotating Concentric cylinder viscometer. Measurement of Flow; Measurement of liquid Levels, Hydrostatic pressure level measurement. Measurement of Humidity. LED; LCD; Cathode-ray displays & Fluorescent displays. Head-up display. Plasma displays	

Student Learning Outcomes (SLO):

On completion of the course the student will be able to:

- Understand various types of sensors used in the field of aerospace systems
- Know about the calibration and its use.
- Design a sensor based measurement system

Pedagogy for Course Delivery: The course pedagogy will include lectures, numerical practice, case studies. It also includes discussion on problems and challenges faced by operation engineers.

List of Experiments

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)
2. Measurement of resolution, sensitivity and non linearity of thermistor (thermistor instability).
3. Measurement of resolution of LVDT (and displacement measurement)
4. Angular frequency (speed of rotating objects) measurement by stroboscope.
5 Pressure transducer study and calibration.
6. Load cell
7. Study of digital gyro scope
8. Study of Accelerometers

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
80	**20**	**100**

Theory Assessment (L&T):

	Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down	**CT**	**S/V/Q**	**HA**	**Att**	**EE**
Weightage (%)	10	8	7	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination	
Components (Drop down	**PR**	**LR**	**V**	**A**	**PR**	**V**
Weightage (%)	10	10	5	5	35	35

IA = Internal assessment , EE External examination

Text Book /Reference

- Sawhney A. K 2000, "A course in Electrical & Electronics Measurement & Instrumentation", Dhanpat Rai & Son's.
- B.C Nakra, K.K Chaudhary. 2004,"Instrumentation, Measurement & Analysis". TMH.

References:

- H.S Kalsi, 1999, Electronic Instrumentation", TMH.

Lecture notes: