

COURSE TITLE : ADVANCED ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
COURSE CODE : 5033
COURSE CATEGORY : E
PERIODS/WEEK : 4
PERIODS/SEMESTER : 52
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Transducers	13
2	Special Purpose Measuring Instruments	13
3	Bio Medical Instruments	13
4	Industrial Instrumentation	13
Total		52

Course Outcome:

Sl.	Sub	On completion of this course the student will be able:
1	1	To understand various types of transducers used in electrical measurements.
2	1	To understand special purpose measuring instruments
3	1	To understand different measuring instruments used in medical field.
4	1	To understand the application of controllers and transducers in instrumentation.

Specific Outcome:

MODULE I Transducers

- 1.1.1 To define transducer.
- 1.1.2 To describe the classification of transducers
- 1.1.3 To compare mechanical and electrical transducers
- 1.1.4 To describe variable resistance transducers-strain gauges.
- 1.1.5 To describe variable inductance transducers - LVDT & RVDT
- 1.1.6 To describe variable capacitance transducers
- 1.1.7 To describe magnetic transducers-magneto resistive & hall effect transducers
- 1.1.8 To describe piezo electric transducers
- 1.1.9 To describe principle and application of photo electric transducers.

MODULE II Special Purpose Measuring Instruments

- 2.1.1 To describe the working of the digital frequency meter with block diagram
- 2.1.2 To describe electronic type energy meter
- 2.1.3 To describe analog multi meter with block diagram
- 2.1.4 To describe digital multi meter with block diagram
- 2.1.5 To describe power quality analyzer with block diagram
- 2.1.6 To explain the working of digital storage oscilloscope
- 2.1.7 To explain the working of function generator with block diagram
- 2.1.8 To explain the working of x-y recorders with block diagram .

MODULE III Bio Medical Instruments

- 3.1.1 To describe invasive method of blood pressure measurements.
- 3.1.2 To describe non invasive method of blood pressure measurements
- 3.1.3 To describe the measurement of body temperature
- 3.1.4 To describe ECG recorders
- 3.1.5 To describe the basic principle of measurement of EEG.
- 3.1.6 To describe the working of EEG recorders
- 3.1.7 To illustrate the application of ECG recorders.
- 3.1.8 To describe the magneto encephalo graph recorders
- 3.1.9 To list the applications of MEG recorder.
- 3.1.10 To describe electro mayography recording (EMGR) principle
- 3.1.11 To write the application of EMGR

MODULE IV Industrial Instrumentation

- 4.1.1 To describe the fundamentals and importance of instrumentation.

- 4.1.2 To explain the types of instruments.
- 4.1.3 To describe selection of instruments and its performance.
- 4.1.4 To describe measurement of temperature.
- 4.1.5 To describe the measurement of pressure.
- 4.1.6 To describe the measurement of moisture content.
- 4.1.7 To describe the measurement of velocity and flow.
- 4.1.8 To describe the measurement of force and torque
- 4.1.9 To describe the measurement of emissivity.
- 4.1.10 To describe the measurement of viscosity
- 4.1.11 To describe the measurement of color.
- 4.1.12 To describe the measurement of spectro-photometry, chromatography and NIR.
- 4.1.13 To describe the measurement with biosensors.
- 4.1.14 To describe the measurement of Basic concept of process controls.
- 4.1.15 To explain the types of control and their application.
- 4.1.16 To describe the measurement & concept of automatic control.
- 4.1.17 To list the types of automatic control measurements.

CONTENTS

MODULE – I

Transducer – classification – comparison – strain gauges- LVDT- RVDT- capacitive transducers- magnetic transducers – magneto resistive – Hall Effect transducers - Piezo electric transducers - photo electric transducers – principle and applications.

MODULE – II

Working with block diagram of Digital frequency meters – electronic energy meter- analog multimeter – digital multimeter – power quality analyzer – digital storage oscilloscope - function generator – X- Y recorders.

MODULE - III

Blood pressure measurement – invasive and non invasive method - Measurement of body temperature - Principle and application of ECG recorders – EEG recorders – magneto encephalo graph (MEG) recorders- electro mayography recorders-applications

MODULE- IV

Importance of instrumentation – selection of instruments - Measurement of temperature – moisture content – velocity and flow – force and torque – emissivity- viscosity – color – spectrophotometry – chromatography – NIR - Bio sensors – concepts of process control.

REFERENCE BOOKS:

1. Beckwith , Thomas G and Lewis B.K.Mechanical Measurements: Adison, Wesely Longman.
2. Donald P. Eckman. Industrial instrumentation: Wiley Eastern Ltd.
3. Krishnaswamy.K. Industrial instrumentation:New age publications.
4. R. S. Sirohi, H. C. Radha Krishna.Mechanical Measurements: Newage International