



C.U.SHAH UNIVERSITY

FACULTY OF: - Technology & Engineering

DEPARTMENT OF: -Instrumentation & Control Engineering

SEMESTER: - IV

CODE: - 4TE04EIM1

NAME – Electronics Instrumentation & Measurement Techniques

Teaching & Evaluation Scheme

| Subject Code | Name of the Subject | Teaching Scheme (Hours) | | | | Credits | Evaluation Scheme | | | | | | | |
|--------------|--|-------------------------|----|----|-------|---------|-------------------|-----|-----------------|-----|-------------------|----|------------|-------|
| | | Th | Tu | Pr | Total | | Theory | | | | Practical (Marks) | | | Total |
| | | | | | | | Sessional Exam | | University Exam | | Internal | | University | |
| | | | | | | | Marks | Hrs | Marks | Hrs | Pr/Viva | TW | Pr | |
| 4TE04EIM1 | Electronics Instrumentation & Measurement Techniques | 4 | 0 | 2 | 6 | 5 | 30 | 1.5 | 70 | 3 | 30 | 20 | --- | 150 |

Objectives

- To study fundamentals of different measuring techniques.
- To study the operation and types of various measuring equipments.
- To study the analysis of different types of waveforms and associated equipments.

Pre-requisite

- Fundamentals of Electronics and measuring units.

Course Outlines

| Sr. No. | Course Contents | No. of Hours |
|---------|--|--------------|
| 1. | <p>Analog Electrical Instruments: Classification, Principle of Operation, Operating torque, Methods of Control , Damping and mechanical balancing of moving system, Basic construction and working principle of Galvanometer.</p> <p>Types of ammeter and voltmeter, theory of operation of moving coil, moving iron, electro-dynamometer and induction type instruments, Errors Relative merits, Calibration and extension of range of by shunts and multipliers.</p> <p>Basic const ruction, working and application of ohm meter, Megger and multi meter Principles of working, methods of connection, Errors, Compensation and use of dynamometer type wattmeter and induction type energy meter.</p> | 12 |
| 2. | Bridges And Their Applications | 10 |

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|-----|--|----|
| | Bridge for measurement of low, high and medium resistances, AC bridge for measurements of inductance, Capacitance and freq. Wagner connection. | |
| 3. | <p>Electronic Instruments For Measuring Basic Parameters : Advantages of electronic meter, basic construction and working of high input impedance voltmeters such as VTVM, FET INPUT, True RMS reading and rectifier type A.C. voltmeter etc.</p> <p>Digital display methods, segmental display, dot matrix display, LED and LCD display, resolution, sensitivity and accuracy of digital meters.</p> <p>Different type of digital voltmeter, Multimeter, frequency, time period and phase angle measurement techniques, High frequency measurement consideration R-L-C and Q measurement, Vector impedance meter, RF Power and voltage measurement. Principles of working of Different type of recorders such as analog, graphics and strip chart, multipoint, X-Y, ultra-violet recorders etc. use of CRO & Computer for recording.</p> <p>Construction and working of CRT, block diagram of CRO & detail understanding of associated function and features, delay line, details of front panel controls, special purpose CRO such as sampling oscilloscope, storage oscilloscope, multi beam, multi trace oscilloscope, CRO probes, Observation and measurement of waveforms and associated parameter like voltage, current , phase and frequency etc.</p> | 20 |
| 4.. | <p>Instruments For Signal Generation And Analysis Of Waveform : Construction and working of sine wave, square wave, pulse and function generators, Sweep frequency generators, Wave analyzer, spectrum analyzer, Distortion analyzers.</p> | 10 |

Learning Outcomes

- Understand fundamental measurement and analysis principles.
- Have a broad understanding of the applications of various measuring equipments used in industrial applications.
- Develop and apply engineering concepts for a range of problems in day to day life applications.

Books Recommended

1. Electrical and Electronic Measurements and Instrumentation by A. K. Sawhney- Dhanpat Rai Publications
2. Electronic Instrumentation and Measurement techniques by Cooper & Helfrick - Prentice Hall Publications
3. Electronic Instrumentation and Measurement by David A Bell - Prentice Hall Publications
4. Electronic Instrumentation by Jones & Chin - Prentice Hall, Simon & Schuster (Asia)