SEMESTER	***DEPARTMENT***	***COURSE TITLE***
Fifth	*Control Engineering*	*Electronic Measurements*
COURSE CODE	***HOURS*** 3 ***UNITS*** 3	***COURSE SPECIFICATIONS***
ET509		*Theoretical Content*

1. ***Sensors and Transducers:***
   - Classification of sensors and transducers.
   - Selection of sensors and transducers.
   - Basic types of sensors and transducers (resistive position transducer, strain gauge transducer, inductive transducer, capacitive transducer, thermo-couple transducer, piezoelectric transducers, thermistors, photo-electric transducers, hall-effect transducers).

2. ***Digital Voltmeters DVM:***
   - Advantages of digital measuring instruments.
   - Basic Digital Voltmeter Architectures (A/D Converters, Decade Counting Units, and Display Unit) and Operation.
   - Types of Digital Voltmeters (Single-slope, Dual-slope, Voltage-to-Frequency Converters, and Successive-Approximation).

3. ***Digital Multimeters:***
   - Basic Digital Multimeter Architectures and Operation.
   - Ordinary and Compensated Attenuators.
   - Current-to-Voltage Converter.
   - Current rectifiers.

4. ***Electronic Counters and Frequency and Time Interval Analyzers:***
   - Frequency counters basic architectures.
   - Universal counter basic architecture and specifications.
   - CW and pulse microwave counters and their basic architectures.
   - Frequency and time-interval analyzer architecture and specifications.

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5. ***Analysis Instruments:***
   - Wave analyzer operations and applications.
   - Harmonic analyzer operations and applications.
   - Spectrum analyzer operations and applications.

6. ***Phase Noise Instrument:***
   - The need to measure Phase Noise.
   - Definition and representations of phase noise.
   - Measurement of phase noise.

7. ***Optical Time Domain Reflectometers:***
   - Basic block diagram of OTDR.
   - Operation of OTDR.
   - The backscattering impulse response.
   - Rayleigh scattering.
   - OTDR applications and specifications.

References:

1. A. D. Halftrack and W. D. Cooper, ***Modern Electronic Instrumentation and Measurements Techniques***, Prentice-Hall.
2. John G. Webster, ***The Measurement, Instrumentation and Sensors Handbook***, Springer Revlag Berlin and Heidelberg.
3. Larry D. Jones, A. Foster Chin, ***Electronic Instruments and Measurements***, Prentice-Hall, Inc.
4. Clyde F. Coombs, Jr. ***Electronic Instrument Handbook***, Forth Edition, McGraw-Hill, Inc.