

University of Mumbai			
Class: S.E.	Branch: Electrical Engineering	Semester IV	
Subject: Electronic Instrument and Instrumentation			
Periods per Week (Each 60 min)	Lecture	4	
	Practical	2	
	Tutorial	---	
		Hours	Marks
Evaluation System	Theory	4	100
	Practical and oral	---	---
	Oral	---	---
	Term Work	---	25
	Total	4	125

Module	Contents	Hours
1	Study Of digital instruments: Meter, digital voltmeter, digital ammeter, digital frequency meter, digital phase meter, digital energy meter, digital tachometer, digital multimeter.	07
2	High frequency measurement: Introduction, resonance method, measurement of inductance, measurement of capacitance, measurement of effective resistance, variation (resistance) method, reactance variation method, Q-meter and its applications.	07
3	Transducer for measurement: Temperature, vibration, velocity, Flow, level, photo-electric, strain gauge and measurement of strain performance, characteristics and selection for given application.	10
4	Signal conditioning and data acquisition system: Chopper stabilized amplifier, Instrumentation amplifier, Generalized data acquisition system, P.C. based data acquisition system.	07
5	SCADA and PLC: Introduction to SCADA, block diagram representation and function of each unit (only), advantages and disadvantages of SCADA system, introduction to PLC.	05
6	Signal generator: Requirement of a good lab type signal generator, A.F. signal generator, function generator.	04
7	Oscilloscopes: Study of dual trace oscilloscope, dual beam oscilloscope, sampling oscilloscope, analog storage oscilloscope [principle of operation and waveform], comparison between analog and digital oscilloscope, use of	08

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Q.1 will be compulsory and based on the entire syllabus.
4. Remaining questions will be mixed in nature.
5. In question paper weightage of each module will be proportional to the number of respective lecture hours as mentioned in the syllabus.

Term work:

Term work consists of minimum eight experiments and a written test. The distribution of the term work shall be as follows,

Laboratory work (Experiments and Journal)	:10 marks
Test (at least one)	:10 marks
Attendance (Practical and Theory)	:05 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

List of Laboratory Experiments:

- 1) Study of Digital Voltmeter.
- 2) Use of CRO in tracing Characteristics of Diode and Transistor.
- 3) Study of Q-meter.
- 4) Study of LVDT.
- 5) Study of Thermistor.
- 6) Study of Thermocouple.
- 7) Study of Instrumentation Amplifier.
- 8) Study of Data Acquisition System.
- 9) Study of High Frequency measurement.
- 10) Study of filter circuit.

Books Recommended:*Text books:*

- 1) Cooper W.D. and Helfrick A.D., *Electronic Instrumentation and Measurement Techniques*, Prentice Hall of India, 3rd Edition, 1993.
- 2) Kalsi H.S., *Electronic Instrumentation*, Tata McGraw Hill, 3rd Edition, 1997.

Reference books:

- 1) Rangam Sharma and Mani., *Instrumentation Device and systems*, Tata McGraw Hill, 1985.
- 2) Doebelin E.O., *Measurement system application and Design*, Tata McGraw Hill, 4th Edition, 1990.
- 3) Jones and Chin., *Electronic Instruments and measurements*, John Wiley and Sons, 1987.

- 4) Jog N.K., *Electronics instrumentation and control*, Nandu Publications, 1st Edition 2001.
- 5) Sawahney A.K., *Electronics, electrical instrument & instrumentation ---* 17th Edition, 2007.