BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Hyderabad Campus

First Semester 2019-2020
Course Handout (Part II)

01.08.2019

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : INSTR F311
Course Title : Electronic Instruments and Instrumentation Technology
Instructor-in-charge : Karumbaiah C N
Team of Instructors : Karumbaiah C N, Ponnalagu R N, Samit Kumar Ghosh, Sarda Sharma.

1. **Scope and objective of the course:**
   The course aims to deal with the following:
   a) Instrument design aspects, techniques and specifications of electronic instruments
   b) Industrial Communication
   c) Instrumentation for typical industries
   The course will consist of lectures, laboratory practice and lab assignments.

2. **Text Book:**
   M.M.S.Anand, Electronic Instruments & Instrumentation Technology, PHI, 2005.

3. **Reference Book:**
   David A. Bell, Electronic Instrumentation and Measurements, Oxford University Press, Third Edition.

4. **Course Plan:**

Lect. No.	Learning Objectives	Topics to be covered	Ref. Chapter (T)
1	Study the basic types of instruments	Classification of instruments,	Class notes
2	Measuring parameters	Understanding calibration, accuracy, precision, error	Class notes
3 - 4	To study basic analog meter	Ammeter, Voltmeter, Ohmmeter, Multimeter	1.1 - 1.4
5 - 6	To study electronic analog meters	Electronic AC & DC meters, Electronics Ohmmeter	1.6
7 - 8	To study electronic Digital meters and its calibration	Digital meter and calibration	2.1, 2.5, 2.6
9	To study different types of passive attenuators	Passive attenuators, L- type, pi-type, T-type, Padding	Appendix A
10- 11	To study digital storage Oscilloscope	Digital storage oscilloscope, Digital phosphor oscilloscope, Controls of an	3.2, 3.4, 3.5, 3.6

Lect. No.	Learning Objectives	Topics to be covered	Ref. Chapter (T)
		oscilloscope	
12	To study Probes	Types of probes, loading, measurement effects	4.1, 4.2, 4.3
13	To study DC bridges.	Wheatstone bridge & Kelvin bridges	5.2
14 – 15	To study AC bridges.	Limitations of AC Bridges – Wagner Ground connection, Anderson loop, LCR Bridge	5.3, 5.4, 5.5
16- 18	To study direct and indirect frequency synthesis	Direct Analog Synthesis, Indirect Synthesis, Direct Digital Synthesis	7.6
19	To study digital signal generators	Arbitrary Waveform Generators, Arbitrary Function Generators, Pattern Generators	7.7
21 – 23	To study concepts of distortion	Distortion, Distortion Analyzer, Wave Analyzer, IMD Analyzer	8.2, 8.3
24- 27	To study signal analyzers	Spectrum Analyzer, FFT Analyzer, Vector Analyzer, Logic Analyzer	8.4, 8.5, 8.6, 8.8
28 - 29	To study the measurement of frequency, period, time interval and frequency ratio	Conventional Electronic Counters, Sources of Measurement Errors, Reciprocal Counters	9.2, 9.3
30 - 31	To study the grounding and shielding techniques	Introduction, Grounding, Shielding, Protection form Electrostatic Discharge	10.2 - 10.4
32 - 33	To study the Product design, layout & assembly	Product Life Cycle, Circuit Design, Circuit layout, Testing and Calibration, Power distribution, Wiring and Cabling, Enclosures, Integrated testing, Documentation	11.2 - 11.4, 11.6 – 11.11
34	To learn science of measurement	Testing, Compatibility, calibration, and Traceability	12.3
35 - 36	To study industrial communication protocols	OSI layers, Network Model, Network Topologies, Interface standards	14.1 - 14.3
37	To study parallel and other communication protocols	IEEE 488 (GPIB), IEEE 488.1, IEEE 488.2, HS 488, HART, Token buses and rings, Ethernet,	14.3
38 - 39	To study the Fieldbuses Device Networks	Moving Up the Layers ,Fieldbuses & Device Networks, Foundation Fieldbus	14.4 - 14.6
40 - 44	To study hazards area instrumentation	Hazardous Area Classifications, Enclosures, Intrinsically Safe Design, Relevant Indian Standards	15. 1 - 15.5

5. Evaluation Scheme:

Evaluation Component	Duration	Weightage	Marks	Date, Time	Remarks
Mid-Sem Exam	90 min	25%	75	30/9, 3.30 -- 5.00 PM	**CB**
Surprise/ announced Quiz (In the Lectures and Tutorials)	15 Min each	10%	30		**CB**
Lab Component	Experimental work	10%	75		**OB**
	End-Sem Project	15%			**OB**
Comprehensive Examination	3 Hours	40%	120	05/12 AN	**CB**
Total		100%	300		

5. **Chamber Consultation Hour:** To be announced in the class.
6. **Course Notices:** All notices related to the course will be placed on CMS
7. **Make–up Examination:** Make-up will be given on **genuine** grounds only. Prior application should be made for seeking the make- up examination. **No make-up will be given for the surprise quiz.**
8. **Academic Honesty and Integrity Policy**:
   Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Karumbaiah C N
Instructor-in-charge
INSTR F311