Veer Narmad South Gujarat University, Surat
Syllabus of Instrumentation for F Y B Sc
Semester – 1 (with effect from June 2012)
Instrumentation Paper – 1 (Measurement Systems)

Unit - I : Measurement Systems

Instrumentation; Measurement, Significance of measurement, Types of measurement: direct, indirect, analog, digital; Null and Detection Method; Functional block diagram of measurement system; Examples, Rudimentary Pressure Gauge; Bourdon Tube thermometer; Input-Output configuration; Desired interfacing and modifying input; General scheme; Examples; Method of corrections; Method of higher gain feedback; Signal filtering; Opposing inputs; computed correction and inherent sensitivity.

Unit - II : Statics Characteristics

Static calibration; Static characteristics; Accuracy & Precision; bias; Combination of Component error in overall system; Accuracy; Calculation; Addition; Subtraction; Multiplication; & Division

Unit - III : Errors

Errors, Absolute and Relative; Types of error; Gross error; Systematic and Random error; Method of correction; Statistical analysis curve; Probable error limiting error.

Recommended Books:

1) E. O. Dobelin, Measurement Systems, Mc Graw Hill
2) A. K. Sawhney, Instrumentation,
3) Gopal Krishna Banerjee, Electrical and Electronic Measurement, PHI, New Delhi
4) Introduction to Measurement and Instrumentation, 3rd Ed, Arun K Ghose, PHI, New Delhi

Veer Narmad South Gujarat University, Surat
Proposed Syllabus of Instrumentation for F Y B Sc
Semester – 1 (with effect from June 2012)
Instrumentation Paper – 2 (Basic Electronics & Electricity)

Unit - 1 : Circuit Theorem & Laplace Transforms

Direct current; Voltage; Ohms law; Kirchhoff's law; terminology; Superposition, Norton, Thevenin, and Maximum power transfer theorem; Star and delta network; Laplace transforms of Common forcing function; Laplace transformation of nth order derivative and Integral; Inverse Laplace transform; Solution of Differential equation of 2^{nd} order.

Unit - 2 : Passive Devices

Passive devices; Resistor Types; Construction, colour codes, Capacitor: types, Construction; Inductor: types; Potentiometer; Charging and discharging of a capacitor; Growth and decay of current in inductor.

Unit - 3 : AC Fundamentals

Alternative current; peak; RMS; and average value; Average and instantaneous power; rotational vector; Phasor representation of sinusoidal; Introduction to three Phase circuit; Balanced three phase circuit; Current and Voltage relationship in star and delta network; power in three phase circuit.

Recommended Books:

1) B. L. Theraja, Electrical Technology,
2) Del Toro, Principles of Electrical Engineering, PHI, New Delhi
3) Kumar & Jain, Electronics Devices and Circuits, 2^{nd} Ed, PHI, New Delhi

There will be practical/laboratory work of two days each of three hours duration per week. The examination will be of three hours duration each from Measurement System and Basic Electronics.

List of Laboratory Experiments for Instrumentation for F Y B Sc Semester - 1:

1) Study of KVL
2) Study of KCL
3) Study of Norton's Theorem
4) Study of Superposition Theorem
5) Study of Thevenin's Theorem
6) Study of Charging and discharging of a capacitor
7) Study of Gaussian probability curve
8) Study of Frequency response of RC circuit
9) Study of Growth and decay of current in LR circuit.
10) Study of Linearity measurement of a sensor.
11) Study of Maximum power transfer theorem
12) Calibration of Voltmeter and Ammeter

Veer Narmad South Gujarat University, Surat
Proposed Syllabus of Instrumentation for F Y B Sc
Semester – 2 (with effect from June 2012)
Electronics Paper – 1 (Electrical Measurement & Transducers)

Unit - 1 : AC Bridges

Electrical Measurement; Measurement of Inductance, Capacitance; General equation of AC Bridge; Shearing Bridge, Maxwell Bridge, Owen's Bridge, Desauty and Wein's Bridge; Measurement of low resistance, Kelvin's Bridge; Galvanometer; PMMC; Moving iron type; Conversion, Measurement of Voltage, Current and resistance; Extension of range, Shunt.

Unit - 2 : Transducers

Transducers; Classification and type; Active and Passive tranducers; Selection and resistive transducers,; Strain gauge, types, Gauge factor, Semiconductor strain gauges; Applications; Potentiometer, Measurement of displacement, Inductive lode; variable reactance, LVDT.

Unit - 3 : Temperature Measurement

Temp Measurement; Basic temperature scales, Non-electrical methods; expansion thermometer; Gas thermometer; Electrical Methods; Thermester;
Thermocouples, Applications

Recommended Books:

Veer Narmad South Gujarat University, Surat
Proposed Syllabus of Instrumentation for F Y B Sc
Semester – 2 (with effect from June 2012)
Instrumentation Paper – 2 (Basic Digital Electronics)

Unit I: Introduction to Digital Systems

Concept of analog and digital modes; Data representation in digital system; Number systems used in Digital electronics: Binary, Octal and Hexadecimal systems, inter conversion, Binary arithmetic, Binary codes, 8421, 2421, BCD and its arithmetic, Gray code, ASCII, Errors in Digital systems and its detection and correction; Hamming Technique.

Unit II: Switching Circuits and Boolean algebra

Basic Binary operations, Switching modes with help of basic logic gates like AND, OR, NOT, De-Morgans Theorem, NAND & NOR as universal logic gates, Laws of Boolean algebra, simplification of Digital circuits using Boolean algebra, special logic gates XOR and XNOR and its application to digital systems.

Unit III: Simplification Techniques

Canonical forms of Boolean expressions, Simplification using Karnught with three and four variables, redundant groups , pairs, quads, octet, Don't care condition in designing digital systems, problems and redundant groups, various examples, Half adder, full adder, half subtractor, full subtractor, various code converter, parity detection and generation, multiplexer and demultiplexer, decoder, encoder

Recommended Books:

1) A Anand Kumar, Fundamentals of Digital Circuits, 2nd Ed, PHI, New Delhi
2) Gothman, Digital Electronics: An Introduction to Theory and Practyices, 2nd Ed, PHI, New Delhi
3) Malvino & Leech, Digital Principles and Applications, TMH

List of Laboratory Experiments Instrumentation for F Y B Sc Semester - 2:

There will be practical/laboratory work of two days each of three hours duration per week. The examination will be of three hours duration each from Electrical measurements and Digital Electronics.

1) Schering Bridge
2) Maxwell Bridge
3) Wien's Bridge
4) Kelvin's Bridge
5) Conversion of Galvanometer into Voltmeter and Ammeter
6) Conversion of Galvanometer into resistance meter
7) Measurement of displacement using potentiometer
8) Thermister as temperature sensor
9) Basic Logic Gates
10) Universal Logic gates
11) Code Converter
12) Half and Full adder
13) Half and Full subtractor
14) Multiplexer and demultiplexer
15)