GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Instrumentation Workshop
(Code: 3311702)

Diploma Programmes in which this course is offered	Semester in which offered
Instrumentation & Control Engineering	**First Semester**

1. RATIONALE

When the students reach the industries, they will be able to identify the various instrumentation devices, measure the current, voltage and power, solder and desolder the components, identify and remedy the electrical faults, test the instrumentation loop and recognize the use of instrumentation tools. They will also be able to select right impediments and tools for the right work.

2. LIST OF COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

i. Select and use the appropriate instrumentation devices for the specific applications.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
0	0	4	4	00	00	40	60	**100**

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit;;
ESE - End Semester Examination; **PA** - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Instrumentation workshop	1.1Identify different instrumentation related devices 1.2 Solder and de-solder the devices in the circuits	1.1 **Electronic components identification**: Resistor, Capacitor, Inductor, transformer, fuse, diodes, Transistor. 1.2 **Soldering**: Techniques to solder and desolder the electronic components on PCB. 1.3 **Measurement**: measurement of electrical parameters (V,I,R,P) with proper instruments. 1.4 **Wiring**: Loop wiring , panel wiring and electrical wiring 1.5 **Troubleshooting**: Testing instrumentation loop, instrumentation panel

5. SPECIFICATION TABLE (for theory)

There is no theory paper and hence specification table for theory is not applicable

6. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list for guidance for exercises/practical/experiments

S.No.	Unit	Exercises/Practical
1		Measure inner & outer diameter using vernier calipers & compare it with standards.
2		Measure thickness of the metallic sheet with micrometer & compare it with standards.
3		Identify different electronic components viz. Resistor, Capacitor, Inductor, transformer, fuse, diode, transistor.
4		Identify various resistors viz. carbon composition, carbon film, cracked carbon, metal oxide film, wire-wound, variable resistors
5		Measure value of given resistor & compare it with theoretical value obtained using colour code.
6		Identify various capacitors viz paper , silvered paper, mica, silvered mica, ceramic plastic foil, electrolytic
7		Identify various inductors viz fixed and variable inductors.
8		Identify various chokes viz A.F. & R.F.
9		Identify Piezo electric crystal & study it's application
10		Measure voltage, current & power using suitable instrument.
11		Connect 3 phase power supply (star , delta) to suitable load.
12		Identify terminals of diodes and transistors
13		Identify & Test fuses & transformers
14	I	Solder and de-solder electronic components on PCB as well solder earth connection.
15	I	Wire instrumentation signals, low/ high power supply and connect appropriate earth to it.
16	I	Wire instrument panel with various accessories as per instrument hook-up diagram.
17	I	Measure voltage, current and power for single and three phase Supply.
18	I	Wire the MCB, ELCB to supply electrical power to instrument panel.
19	I	Wire the MCB, ELCB, contactor, starter to supply electrical power to motor drive panel as per given wiring diagram for one application.
20	I	Prepare specifications for instrumentation tools, wires, cables, switches, electronic components for a given application.
21	I	Wire electrical circuit diagram using IEEE standard symbols for one instrument panel application.
22	I	Wire instrumentation loop as per given diagram using ISA standard symbols for one instrument panel application controlling single loop.
23	I	Identify open circuit, short circuit faults.
24	I	Test assembled instrument loop wiring for various parameters and faults.
25		Troubleshoot instrument panel wiring for various parameters and faults.
26		Identify tools, equipments & components required for installation of process control instruments.
27		Dismantle & assemble valve to identify it's components as per sketch .
28		Dismantle, assemble & calibrate pressure guage.
29		Dismantle & assemble recorder to identify it's components.
30		Install any one instrument using screw type connection.
31		Install any one instrument using flange type connection.
32		Install any one transmitter as per sketch with bill of materials.
33		Test pressure/flow/level/temperature switch.
34		Test proximity & limit switch.

Note: At least 24 exercises/practical from the above should be performed.

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Students are required to prepare and submit a laboratory report on instruction/demonstration given by instructor and workshop activities done by students as a part of term work.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Author	Title of Books	Publication/Year
1	Murthy, D. V. S.	Transducers and Instrumentation	PHI Learning 2011
2	Kalsi, H.S.	Measurement Systems	Mcgraw hill Publishers 2011
3	Bell, D.A.	Electronic Instrumentation and Measurements	PHI Learning 2010
4	Carr , Joseph J.	Elements of Electronic Instrumentation and Measurements	Pearson Education, 2010

B. List of Major Equipment/ Instrument:

Multimeter, Megger, Clamp-on meter, CRO, soldering iron, de-soldering pump, pliers, cutters, L-end key, spanner(ring/open/box/adjustable),stripper, screw driver, pointer remover, tube bender, tube cutter, flaring tools etc.

C. List of Software/Learning Websites

I.http://www.instrumentationworld.com/instrumentation_tutorial.htm
II.http://www.pc-education.mcmaster.ca/Instrumentation/go_inst.htm

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. R R Manchiganti**, HOD, Dept. of IC, Government Polytechnic, Gandhinagar
- **Shri A K Bilakhia**, Lecturer IC, Government Polytechnic, Gandhinagar
- **Shri Ashvin M. Patel**, Lecturer IC, Government Polytechnic, Palanpur
- **Shri H. P. Patel**, Lecturer IC, Government Polytechnic, Ahmedabad
- **Shri M B Vanara**, Lecturer IC, Government Polytechnic, Ahmedabad
- **Shri M J Dehlvi**, Lecturer IC, Government Polytechnic, Gandhinagar

Coordinator and Faculty Memberfrom NITTTR Bhopal

- **Dr. Joshua Earnest,** Professor and Head, Dept. of Electrical & Electronics Engg, NITTTR Bhopal.
- **Prof. A.S.Walkey**, Associate Professor, Dept. of Electrical & Electronics Engg, NITTTR, Bhopal.