

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Instrument Configuration Practices
(Code: 3321704)

Diploma Programmes in which this course is offered	Semester in which offered
Instrumentation and Control Engineering	Second Semester

1. RATIONALE

In instrumentation engineering the instruments of a given process loop will have to be configured with the help of relevant operating systems and networking technology. Therefore this course has been designed to achieve this objective for which the student will also have to understand the programmable instrumentation devices, installation of associated software troubleshooting as prescribed by the respective manufacturer.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- i. **Configure the instruments of a given instrumentation process loop with the help of relevant operating systems.**

3. TEACHING AND EXAMINATION SCHEME

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

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

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Networking Technology and Internet	1a. Identify devices and components needed for networking	1.1 Basic concept of Networking 1.2 Various topologies of Local Area Networks (LANs)
	1b. Install the various software and search engines required for networking	1.3 Uniform Resource Locator (URL) 1.4 Installation and configuration of Local Area Networks (LANs) and Internet 1.5 Basic features of Web browser, technical web browsers: Internet explorer, Mozilla Firefox, Google chrome etc.
Unit– II Installation of Thermal and flow measuring instruments	2a. Explain the working principle of various thermal instruments	2.1 Thermocouple, RTD 2.2 Filled System Thermometer, Bimetallic Thermometer
	2b. Explain the working principle of various flow measuring devices	2.3 Orifice plate, Venturi tube, Pitot tube, Rotameter
Unit– III Pressure measuring devices	3a. Explain the working principle of various pressure measuring devices	3.1 Bourdon tube, Bellows, Diaphragm, Differential pressure transmitter (DPT)
Unit-IV Configuration	4a. Configure installed instruments in a process loop	4.1 Concept of configuration, configuration of level loop, 4.2 Basic configuration of pressure loop, temperature loop, flow loop
Unit-V Calibration	5a. Calibrate the installed instrumentation devices	5.1 Need of calibration 5.2 Calibration of: i) Thermal devices (thermocouple, RTD, filled system) ii) flow devices (Rotameter, Orifice) iii) pressure devices (DPT, Bourdon tube type pressure gauge, diaphragm) iv) level measuring devices (float type)

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

-----Not applicable-----

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned expected competency.

Sr.No.	Unit No.	Practical Exercise	Approx. Hours Required
1	I	Connect Switches and Routers.	2
2	I	Trace LAN- STAR Topology	2
3	I	Trace LAN- TREE Topology	2
4	I	Trace LAN- BUS Topology	2
5	I	Install and Test INTERNET and WEB Browsers.	4
6	II	Install and Test Thermocouple with Well	4
7	II	Install and Test Thermocouple without Well	2
8	II	Install and Test 2 wire RTD	4
9	II	Install and Test 3 wire RTD	2
10	II	Install and Test 4 wire RTD	2
11	II	Install and Test Filled System Thermometer	4
12	II	Install and Test Bimetallic Thermometer	2
13	II	Install and Test Concentric Orifice with Flanged Taps	4
14	II	Install and Test Concentric Orifice with Venacontracta Taps	2
15	II	Install and Test Concentric Orifice with Piped Taps	2
16	II	Install and Test Venturi Tubes with Flanged Taps	4
17	II	Install and Test Venturi Tubes with Venacontracta Taps	2
18	II	Install and Test Venturi Tubes with Piped Taps	2
19	II	Install and Test Pitot Tubes	4
20	III	Install and Test pressure measuring devices	2
21	IV	Configure DPT	2
22	IV	Configure Level Switch (Float Type)	2
23	IV	Configure Temperature Switch	2
24	V	Calibrate RTD	2
25	V	Calibrate Thermocouple	2
26	V	Calibrate Bourdon Gauge	2
27	V	Calibrate Float Type Level Switch	2

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

- 7.1 Students may be asked to collect photographs using internet which is relevant to field application of various topics & have to prepare learning materials using it.
- 7.2 Teachers guided self learning activities, industrial visit, Course/library/internet/lab based mini projects etc.
- 7.3 Students activities like: course/ topic based seminars, weeklong implant training, Internet based assignments.

8. SUGGESTED LEARNING RESOURCES

A. Installation Manuals List (Books)

Sr. No.	Instrument Manufacturer /Author	Title of Manual / Books	Instrument Manufacturer Publication
1	B.G. Liptak	Instrument Engineers' Handbook, Fourth Edition, Volume One and Two:	CRC press
2	W.G.Andrew/H. B.Williams	Applied Instrumentation in the Process Industries- Vol 1 to 3	Gulf Publishing Company
3	Yokogawa	Installation Manual LAN- STAR Topology , LAN- BUS Topology	www.yokogawa.com
4	Rockwell Automation	Installation Manual for Thermocouple , RTD ,	www.rockwellautomation.com
5	Fischer Rose Mount	Installation Manual for Pressure ,Level ,Flow ,Temperature measuring instruments /Switches	www.fisher.com
6	JNMARSHALL Product Groups Forbes Marshall	Installation Manual for Pressure ,Level ,Flow , Temperature measuring instruments /Switches, Temperature measuring instruments /Switches , Orifice ,Thermocouple with Well	http://www.forbesmarshall.com/fm_micro/productGroups.aspx?id=JNMARSHALL
7	Bestobell	Installation Manual for Pressure ,Level ,Flow ,Temperature measuring instruments Filled System Thermometer , Thermocouple with Well /Switches	http://www.bestobell.com/concrete5.5.2.1

B. List of Major Equipment/ Instrument as mentioned in curriculum

- 8.1 Thermocouple,RTD,Bimetallic thermometer
- 8.2 Flowmeters, Scanner ,Web Camera etc.

C. List of Software/Learning Websites

1. Windows operating System
2. MS Office
3. Process Instrumentation Simulation software
4. <http://en.wikipedia.org/wiki/Instrumentation>

5. http://en.wikipedia.org/wiki/Resistance_thermometer#Wiring_configurations

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnic

1. **Prof.N.B.Mehta**, LECTURER IC ENGG., Government Polytechnic, Ahmedabad
2. **Prof.S.K.Raval**, Lecturer IC ENGG., Government Polytechnic, Ahmedabad
3. **Prof.M.B. Vanara**, Lecturer IC ENGG., Government Polytechnic, Ahmedabad
4. **Prof.Naved J. Dehlvi**, Lecturer IC ENGG., Government Polytechnic, Gandhinagar.

Co-ordinator and Faculty Member from NITTTR Bhopal

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