



Gujarat Council of Vocational Training
Gandhinagar



1. Name of Course:

INDUSTRIAL INSTRUMENTATION

N.C.O. No. for Skills Covered.
(Please refer National Classification of
Occupations -2004 available
on www.dget.nic.in)

2. Engineering OR Non-engineering: Engineering

3. No. of students per batch: 20

4. Duration in Hours. : 520

5. Duration in Month: _____ @ 42 hours/Week.

Duration in Month: 6@ 22 hours/Week.

5. Examination Scheme:

No.	Name of Subject	Teaching Hours during full course.	Maximum Marks. (Excluding Sessional)	Minimum Marks required for Passing (Excluding Sessional).	Sessional Marks if any.
Subject-1	Theory	260	100	40	
Subject-2	Practical	260	300	180	
Subject-3					
Subject-4					
Subject-5					

7. Entry qualification for Trainee:

Minimum entry qualification (Essential):	10 th /ITI/DIPLOMA/BE FRESHER
Desirable:	10 th /ITI/DIPLOMA/BE FRESHER

3. Minimum qualification for Trainer:

Minimum qualification (Essential):	DIPLOMA/BE WITH 2 YEARS EXP.
Desirable:	DIPLOMA/BE WITH 2 YEARS EXP.





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9. Syllabus Committee Member:

Sr. No.	Name	Organization	Designation	Technical Qualification	Experience in Years	Signature
1.	MR.K.B.SHAH	KRUPA HYDRO	DIRECTOR	BE(MECH)	30	
2.	MR.CHANDRESH DAVE	ADSC INSTRUMENTATION	REGIONAL HEAD	M.Sc(Electronics)	34	
3.	MR.C.K.SHAH	CONSULTANT	TECH.EXPERT	Diploma Instrument	35	
4	MR.JAINAM SHAH	KRUPP INDU EDU CENTER	FACULTY	BE/EC	2	
5	MR.B.R.VYAS	RDD OFFICE VADODARA	TECHNICAL OFFICER	Diploma in Tools Engg	33	
6	MR.V.T.PATEL	EX.RIL.VADODARA	GM(INST)	DIPLOMA INST	35	

10. Terminal Skills of trainee: (Should be well defined and having reference to NCO):

The trainee, after successful completion of training, will have following skills...

1. Calibration/Testing of Field Instruments
2. Erection/Installation/ of Field Instruments
3. Commissioning Activities like loop checking & Interlock checking
4. Instrumentation Maintenance activities

(please attach separate sheet, if more space is required)

11. Approximate cost of Tools / Equipments / Machinery for starting one batch of the course:

Rupees: 25 lacs

Reference Year
2014

468 Sq. Meters

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12. Area required for practical / Workshop for one batch.

13. Minimum Power connection required

19 KW

14.1 No of items in Standard list of Machinery :

list attached

14.2 No of items in Standard list of Shop outfit :

list attached

14.3 No of items in Standard list of Trainee Toll-Kit :

list attached

***** FOR OFFICIAL USE *****

Approved by GCVT in ~~Governing Body meeting~~ on

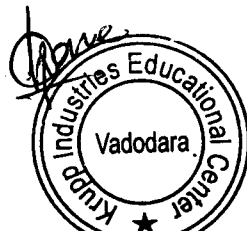
: 20/9/2017

Syllabus implemented w.e.f. admission session

: Immediate

Revision History :

1. Revision No..... Revision Date.
2. Revision No..... Revision Date.
3. Revision No..... Revision Date.





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Standard List of Machinery - Equipment / Shop-outfit / or Trainee Toolkit

For Trade of Industrial Instrumentation

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1.	Control valve	Instrument	2	0	2
2.	AFR	Instrument	5	0	5
3.	I/P convertor	Instrument	1	0	1
4.	MTL loop powered indicator	Instrument	1	0	1
5.	Rosemount pressure transmitter	Instrument	4	0	4
6.	Fuzi gauge pressure transmitter	Instrument	1	0	1
7.	Pressure switch	Instrument	2	0	2
8.	Honeywell Smart temperature transmitter	Instrument	1	0	1
9.	Pressure gauge	Instrument	20	0	20
10.	Digital temp controller	Instrument	2	0	2
11.	RTD & Thermocouple	Instrument	3	0	3
12.	PLC	Instrument	1	0	1
13.	Orifice pipe Assembly with manifolds	Instrument	3	0	3
14.	Timer	Instrument	2	0	2
15.	Process Simulation Software	Instrument	1	0	1
16.	Comparator & dead weight	Test Equipment	2	0	2
17.	24 V supply unit	Test Equipment	1	0	1
18.	Multimeter	Test Equipment	3	0	3



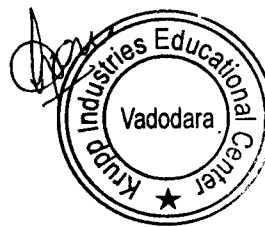
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Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for instructor	Total Quantity Required (Total of previous two columns)
19.	Gipitronics-handcal MA source	Test Equipment	1	0	1
20.	Handheld mA/mV/Ohm Source	Test Equipment	1	0	1
21.	HART 375 Communicator	Test Equipment	1	0	1
22.	Field bus Module	Test Equipment	1	0	1
23.	-1 to 40 Kg/cm ² Hand Pump	Test Equipment	1	0	1
24.	U tube Manometer & Incline Manometer	Test Equipment	2	0	2
25.	Hydraulic Pump	Machinery	1	0	1
26.	Air Compressor	Machinery	1	0	1

Krupp Industries
Educational Center
201, Kashyap Complex, Opp. Masonic Hall
BPC Road, Alkapuri, Vadodara-390 001





Week No.	Practical	Theory
1.	<p>Familiarization with various departments and workshops of industry.</p> <p>Personal safety and precaution taken during work with machineries.</p> <p>Demonstration and working with various machineries used in workshop of industry.</p>	<p>Give detail knowledge of industrial safety. What precaution should taken at work</p>
2.	<p>Identify the type of flow used in industry.</p> <p>Working with primary elements of flow measurement such as</p> <ul style="list-style-type: none">-Orifice flow meter-Ventury flow meter etc. <p>Measurement of flow rate using Rota meter.</p>	<p>Brief Knowledge of flow measurements, basic flow measuring principles & some flow meters:-</p> <p>U-tube manometer, orifice, ventury, Rota meter etc.</p>
3.	<p>Measuring flow rate using Advanced technique of flow measurements</p> <ul style="list-style-type: none">-Vortex flow meter-Turbine flow meter-Electromagnetic flow	<p>Brief Knowledge of some advanced flow measurement technique:-</p> <p>Vortex flow meter, Carioles flow meter, Turbine flow meter, Electromagnetic flow meter, ultrasonic flow meter.</p>
4.	<p>Maintenance and servicing of all types of flow meters.</p>	<p>Maintenance and servicing procedure of all types of flow meters.</p>



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5.	Identify the type of level indicators and Transmitters used in industry. Working with direct level measuring and indicating instruments such as: - sight glass level indicator - float type level indicator - hook type level indicator	Level meters:- Sight glass level indicator, float type level indicator, hook type level indicator, air purge level indicator
6.	Measuring level using advanced technique of level measurements - Piezoresistive level indicator - capacitance type level indicator	Brief knowledge of some advanced level measurement techniques:- Ultrasonic level indicator, piezoresistive level indicator, capacitance type level indicator
7.	Maintenance and servicing of all types of level indicators and measuring instruments.	Maintenance and servicing procedure of all types of level indicators and measuring instruments
8.	Identify the type of pressure indicators and transmitters used in industry. Pressure measurement by: -bellows -diaphragm -bourdon tube	Brief knowledge of measurements, basic pressure measuring principles & some pressure meters:- Bellows, diaphragm, bourdon tube
9.	Measuring pressure using advanced technique of pressure measurements - peizo-electric pressure transducer -low pressure measurements -LVDT -load cell -strain gauge	Brief knowledge of some advanced pressure measurement techniques:- Peizo-electric pressure transducer, low pressure measurements, LVDT, load cell, strain gauge



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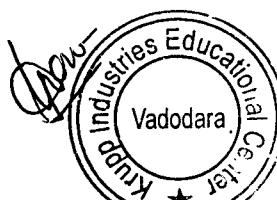
10.	Maintenance and servicing of all types of pressure indicators and measuring instruments.	Maintenance and servicing procedure of all types of pressure indicators and measuring instruments.
11.	Identify the type of temperature sensor and transmitters used in industry. Temperature measurement by : -Different types of thermometer -RTD -Thermocouple -Bi-metallic strip -Thermistor	Brief knowledge of temperature measurements, basic temperature measuring principles & some temperature meters:- Different types of thermometer, RTD, Thermocouples, Bi-metallic strip , Thermistor.
12.	Dismantling & boxing of Control Valve Valve leakage Testing & Calibration of Control Valve and Positioner Testing of On-Off Valve, Actuator & solenoid valve	Control Valves Terms, Types & selection Parameters Valve Positioner Sliding stem control valves Control valve sizing Rotary shaft control valves Control Valve Classifications Actuators basics, spiting Diaphragm Control valve noise & cavitations Actuator sizing Control valve maintenance Valve response
13.	Calibration using experimental set up for vortex flow meter, turbine flow meter, electromagnetic flow meter, U-tube flow meter, orifice, ventury, rotameter.	Calibration of flow meters mentioned above
14.	Calibration using experimental set up for sight glass level indicator, float type level indicator, hook type level indicator,	Piezoresistive level indicator, capacitance type level indicator. Calibration of level meters mentioned above



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15	Calibration using experimental set up of pneumatic calibrator, dead weight tester.	Calibration of pressure meters mentioned above
16.	Calibration using experimental set up for digital calibrator for temperature, thermocouple type pyrometer with mV potentiometer. Temp. Source like furnace & bath.	Calibration of temp meters mentioned above
17	PLC programming	Basics of PLC and Module functions. Overview of DCS architecture & Type of Hardware, Communication & Software used in DCS.
18-22	Simulation of PID controller and different type of controls. Checking & Calibration of Smart transmitters with HART / FIELDBUS confugirator.	<u>Closed Loop controls</u> Process control basics Understanding Control Loops Loop Tuning & Valve Considerations PID & Cascade Basics Feed Forward control Ratio Control Process Terminology & Behaviors <u>Smart Transmitters</u> HART Communication Field Bus Technology





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23.25	Different types of Hook-up & manifolds & Control loops.	Details explanation on Construction and Commissioning Activities. How to read P & ID Diagram. Punching System Installations Datasheet explanation Symbol understanding. Hook- Up Details QC system details Loop diagram details
26	Demo of different type of Enclosures, Junction Box & Panels.	Overview of Safety Sensors like Explosion & /Toxic gas sensors. Hazardous area classification.

