

1	Name of Course	C.C. in Instrument Mechanic(chemical) (307107)																																									
2	Max.Nos. of Student	25 Students																																									
3	Duration	6 Months																																									
4	Type	Full Time																																									
5	Nos Of Days / Week	6 Days																																									
6	Nos Of Hours /Days	7 Hrs																																									
7	Space Required	Laboratory = 1000 Sq feet Class Room = 200 Sq feet TOTAL = 1200 Sq feet																																									
8	Entry Qualification	S.S.C.+ Any Course in Chemical Group of MSBVEE OR ITI In Chemical Group / COE in Process Plant Maintenance / Diploma / Degree in Chemical Group																																									
9	Objective Of Syllabus/ introduction	Awareness of Safety precautions. Awareness of Electronics. Awareness of Instrumentation. Awareness of Instrument Mechanic Awareness as Basic Mechanical Process & Instrumentation																																									
10	Employment Opportunity	The trainee will either to be able to take up jobs with agencies which Develop, Maintain, Repair Work as Instrument Mechanic or with working experience will be in a position to start his own independent Business.																																									
11	Teacher’s Qualification	Diploma in Chemical Engineering.																																									
12	Training System	Training System Per Week <table border="1"><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>							Theory	Practical	Total	12 Hours	30 Hours	42 Hours																													
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13	Exam. System	<table border="1"><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30710711</td><td>Instrument Mechanic</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30710721</td><td>Basic Mechanical Process & Instrumentation.</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30710722</td><td>Instrument Mechanic</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>185</td></tr></table>							Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30710711	Instrument Mechanic	TH-I	3 hrs	100	35	2	30710721	Basic Mechanical Process & Instrumentation.	PR-I	3 hrs	100	50	3	30710722	Instrument Mechanic	PR-II	6 hrs	200	100			TOTAL			400	185
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SYLLABUS

Theory & Practical Instrument Mechanic

Practical – II	Theory - I
Calibration of pressure instruments using dead weight tester Dismantle the pressure gauge & study the construction & correct functioning.	Standard pressure gauge Pressure recorder Pressure switch Barograph Pressure regulating Valve Pressure transmitter Draft gauge Magnetic pressure gauge Magnehelic gauge
Calibration of expansion thermometers Calibration maintenance & reconditioning of thermocouple, Pyrometers	Temperature switch Optical pyrometer Radian pyrometer Thermostats Temperature gauges (Fluid) Thermostat Thermister IR temperature indicator (contact less)
To study of flow nozzles , heads ,there shape & connection	PD flow meter Differential flow indicator Capacitance type level indicator Sight glass level indicator Air purge system Weighting machine for level management Elbow transmitter Flow switch Thermal mass flow Ultrasonic flow Mass flow
Study construction of hook type, sight glass,& float type Level measuring instruments of closed & open tank. static pressure level measuring system	Buoyancy level transmitter DP transmitter Magnetic level transmitter Level switches Displayer type level transmitters Capacitive level switch Turbine flow meter Magnetic level gauge

To study various types of potentiometer	Viscometer Melting point & Boiling point apparatus Conduct meter Refract meter Polar meter Flame Photometer Oxygen analyzer CO & CO ₂ analyzer Potentiometer
To study conductivity meters	Colorimeter Spectrophotometer Gas Chromo to meter Thermal conductivity based Analyzer Electrochemical based analyzer Gas Decor (Electrochemical solid state IR) Conductivity meter
Study of ammeter voltmeter wattmeter & multimeter	Ammeter Voltmeter Wattmeter
Calibration of mechanical recorders, adjustment of time travels, changing charts, ink, minor rectification. Calibration of temperature transmitter & its adjustment Recording & calibration Of current to air & pressure to current converter Reconditioning of EMF To current, converter & Its calibration	Digital temperature transmitters Potential metric type recorders DP recorder Receiver recorder Temperature transmitter (Pneumatic & Electronic) Pressure transmitter (Pneumatic & Electronic) DP transmitter (Pneumatic & Electronic) R.T.D. Transmitter (Electronic) Thermocouple transmitter (Electronics) PH (on line) – PH sensor, PH transmitter Dissolve oxygen – D.O.sensor,D.O.transmeter Online conductivity meter- sensor + indicator Ultrasonic transmitter Radar type transmitter Servo level gauge Foric type transmitter P to I converter EMF to I converter RTD to I converter 0.5 V to P converter Pressure recorder Temperature recorders Temperature indicator cum recorder

Study the construction, identification of component of ON-OFF type controller Testing & calibration of ON-OFF type control system of	Temperature scanners ON OFF controllers PID controllers (Pneumatic and Electronics) Control valves Control valves with petitioners
pneumatic & electronic pressure, temperature. Check calibration of proportional controller, Reconditioning, adjustment, setting of propotional band.	Pneumatic calibrators Pulse to current converter Serial converter Solenoid valve RS 382 tro RS 485 converter K I to P type converter profile controller
Study of digital millimeter & Study of analog millimeter Study off LCR, PLC, DCS, and SCADA. Study of master instruments	Digital power supplies Digital current sources power supply Electronics trainer Electronics IC trainer Digital MultiMeter and Analog multimeter L.C.R. (Source and measure) P.L.C. D.C.S. Computers to study different process application (4 no.) S.C.A.D.A. Universal calibrator Temperature bath Dead weight tester RTD simulator Pressure calibrator Single limb monometer 24 V , 5 amp, DC Power supply Inverters
To calculate overall heat transfer co-efficient for a shell & tube heat exchanger To find out rate of evaporation of a vertical tube evaporator Separation of a lig. Mixture by distillation using packed tower Operation of spray extraction column Study expt. For urea, cement	Heat exangers, evaporation, Distillation, extraction. Manufacturing process for Urea , Ammonia , Sulpur Cement , Petroleum refining, glass.

List of Instruments and Equipments

A) Electrical Instruments		
01	Moving coil voltmeters (various ranges)	04 each
02	Moving coil ammeters (various ranges)	04 each
03	Moving millimeters (various ranges)	04 each
04	Moving milli voltmeters (various ranges)	04 each
05	Galvanometer, center-zero indicating	01 No.
06	Moving iron AC-voltmeters, various ranges	04 each
07	Moving iron Ac-ammeters, various ranges	04 each
08	Voltmeter dynamometer type AC & DC	02 Nos
09	Ammeter dynamometer induction type AC & DC	02 Nos
10	Wattmeter dynamometer type	01 No.
11	Power factor meter	01 No.
12	Hot wire instruments	01 No.
13	Clamp on AC-Ammeter	01 No.
14	Ohm meters multi-ranges	01 No.
15	Insulation testers (meager) 500 volts	01 No.
16	Watt hour meter	04 Nos.
17	Frequency meter, vibrating reed type	01 No.
18	Ampere hour meter	02 Nos.
19	Millimeter (AVO)	02 Nos.
20	Calibration for ammeters, voltmeters, ohmmeters	01 No.
21	Calibration for wattmeter, energy meters	01 No.
22	Bridge for resistance, capacitance, inductance	01 No.
23	Workshop potentiometer, withgalvo & std. cell	01 No.
24	Regulated power supply with variable DC source	01 No.
25	Servo operated AC voltage stabilizer, 10 KVA	01 No.

Practical - I

Basic Mechanical Process & Instrumentation

Introduction, types of work done in the section. Lathe –its parts and functions check it for proper running, cleaning and oiling of various parts .holding job in four jaw chuck & turning.
Grinding rough turning tool. Setting tools in tool post facing operation, thus making the job to specified length and centre drilling.
Plain turning by holding job in the chuck. turning to specified diameter, Step turning, grinding of finishing tool.
Taper turning by swiveling compound rest. Taper turning by off setting tailstock. Knurling practice-drilling practice boring practice. Thread cutting (metric)
Assembly of oxy-acetylene plant and arc welding Lighting and adjustment of oxy-acetylene flame
Fusion run with and without rod. Square butt joint, corner joint on ms sheet by gas welding. Pipe joints, butt and T joints
Arc striking and bidding on ms plate. Square butt joint, centre joint on ms plate – 6mm and 8 mm thick. Pipe joints, butt and T joints.
To study the working construction and principle of pressure gauge C-type bourdon tube pressure gauge, spiral type, helical type. Capsule type pressure gauge
Bellow type pressure gauge and diaphragm type Take reading practice of all types of manometers and capsule type gauges.
Take reading , practice of bimetallic thermometer Measuring in glass thermometer, thermocouples PT-100.
Mercury in gas filled thermometer RTD Thermocouple
Take reading practice of Orifice meter , Venturimeter
Take reading practice of Rota meter, Pitot tube and magnetic flow meter.
Take reading practice of different types of level measuring instruments
Take reading practice of hydrometers Take reading practice of pH meter Take reading practice of hygrometer