

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Fabrication Technology

Semester : 4

Subject Name: Instrumentation Control & Quality Assurance

Sr. No.	Course Content
1.	MEASUREMENT IN INDUSTRIES 1.1 Introduction • Significance of measurement • Standard of measurement • Mechanical measurement • Methods and modes of measurement • Measurement system & functional element • Classification, selection factor and function of instruments • Input output functions 1.2 Static and Dynamic characteristics of instruments • Definition relating to measuring instruments • Static characteristics • Dynamic characteristics 1.3 Errors in measurement • Limiting errors • Types and sources of errors 1.4 Metrology • Meaning, objective, importance and necessity • Need of dimensional accuracy and precision measurement • Q.C.- Metrology as means to achieve • Standards of measurements • Methods of achieving precision and accuracy • Sources of error • Classification of measuring instrument and methods of measurement • Selection of instruments 1.5 Principle of measuring instruments • Classification and specification • Principle of mechanical measuring instruments • Principle of optical instruments • Linear measurement ○ Engineer steel rule, vernier caliper, height gauge, depth gauge, micrometer, slip gauge. • Angular and taper measurement ○ Bevel protector, sine bar, Angle Gauge • Measurement of surface finish ○ Surface texture, methods of measuring surface finish, comparison & direct instrument measurement. • Optical measuring devices ○ Magnifier, microscope, optical projector, telescope, collimeter, auto collimeter, Straightness, flatness, squareness and parallelism measurement.

2.	INSTRUMENTATION CONTROL IN PROCESS INDUSTRIES 2.1 Pressure measurement • Definition and units • Manometer, bell gauge, mechanical gauge, pressure transducers, McLeod gauge, thermal conductivity gauge, ionization gauge. • Calibration of pressure measuring equipment. 2.2 Flow measurement • Flow measurement method • Variable Head flow for incompressible and compressible fluids. • Rota meter, Elbow meter, Electromagnetic, Hotwire anemometer, Current & turbine meter, vortex meter Ultrasonic flow meters, Nutating disc meter, rotary vane meter, lobed impeller horometer. 2.3 Temperature measurement • The international Practical Temperature Scale • Expansion Thermometer, Pressure thermometer, Electrical Resistance Thermometer, Thermistors, Thermocouple, Radiation pyrometer, optical pyrometer 2.4 Introduction to Automatic Control
3.	INSPECTION 3.1 Need, Scope and Importance of inspection in industry 3.2 Types of inspection and Inspection Agencies 3.3 Inspection of process equipment fabrication 3.4 Centralized and decentralized profile of Inspector 3.5 Duties of inspector • Profile of an Inspector • Interpretation of Specification • Measurement of Product • Comparison with Standards • Judging Conformity • Disposition of the Product • Recording Data • Role of Third Party Inspection (TPI) 3.6 Inspection Planning • Necessity for planned Inspection • What to Inspect • How to Inspect • Where to Inspect • When to Inspect • How much to Inspect 3.7 Interchangeability & selective assembly 3.8 Understanding of fundamental linear measuring units 3.9 Calibration its needs and importance. 3.10 Calibration of vernier, micrometer, pressure gauge & thermometer.
4.	QUALITY CONTROL 4.1 Definition of Quality as Fitness for Use 4.2 Parameters of Fitness for Use • Quality of Design • Quality of Conformance • Abilities

	• Availability • Reliability • Maintainability • Field Service 4.3 Factors Affecting Quality of a Product • Control • Definition • Regulatory Process of control 4.4 Quality Control • Definition • Basic Objectives • Advantages of Quality Control • Role of technician in Quality Control • Promoting Quality Mindedness amongst Workers and Operator
5.	MODERN TOOLS & TECHNIQUES FOR QUALITY ASSURANCE 5.1 Principle, procedure and application of • TQM, • ISO 9000, • 5s • Quality Circle • Zero Defect • Six Sigma • Kaizen • Benchmarking • Kanban • JIT • PokaYoke

Laboratory Experience:

Experience no.	Description of Laboratory Experience
1.	DEMONSTRATION & STUDY (REPORT / OBSERVATION WRITING) 1. Vernier Caliper 2. Micrometer Screw 3. Bevel Protector 4. Spirit Level 5. Slip Gauge 6. Angle Gauge.
2.	JOB PREPARATION (WRITE SEQUENCE AND PARAMETERS OF OPERATION)
3.	SEMINAR & PRESENTATION 1. Prepare a Seminar using Power Point Presentation / Transparencies on the topic covered in syllabus / beyond the syllabus 2. Give 10 minutes presentation 3. Group discussion
4.	PREPARATION OF MODELS , CHARTS QUIZ COMPETITION & SLOGANS (GROUP / INDIVIDUAL)
5.	INDUSTRIAL VISIT Term work content of industrial visit report should also include following a) Brief detail of industry visited b) Type, location, product, rough layout, human resource, etc of industry. c) Details, description and broads specification of machinery / process observed. d) Safety norms and precautions observed e) Student on observation on industrial environment, culture and attitude f) Any other detail / observation asked by accompanying faculty. Industrial visit of fabrication industry.
6.	SHEET & SKETCH WORK
7.	REPORT WRITING 1. Static and Dynamic characteristics of instruments 2. Linear Measuring Instruments 3. Angular and taper measuring instruments 4. surface finish measurement 5. Optical measuring devices 6. Straightness, flatness, squareness and parallelism measurement. 7. Flow measurement 8. Pressure measurement 9. Temperature measurement 10. Automatic Control 11. Duties of inspector 12. Inspection Planning 13. Calibration its needs and importance. 14. Quality Control 15. Modern tools & Techniques for Quality assurance

8.	BEYOND SYLLEBUS ACTIVITIES (DEVELOP CREATIVE & INNOVATIVE IDEAS AMONG STUDENTS) Display Article, Information, Sketch, under Knowledge Zone(K-Zone), Inspiration Zone(I-Zone) & Creative zone(C-Zone)
9.	LITERATURE SURVEY 1. Library Assignment 2. Internet Surfing 3. Refer Product Pamphlets 4. Technical Magazines
10.	SHOP TALK 10 minutes presentation on shop floor / laboratory during the preparation of job / laboratory experience by the students
11.	AUDIO VISUAL AIDS 1. Prepare Audio Cassette 2. Photograph Lab Manual 3. Technical Video Download
12.	PAPER SOLUTION 1. Write Paper Solution of Last Five Examination Papers
13.	SCHOOL WITHIN SCHOOL 1. Guiding / Sharing /Mentoring the know-how by meritorious students to lower performing students.
14.	SELF LEARNING 1. Contact with field expert, seniors, alumni and get further know-how individually or in a group. 2. Read related book/magazine/article/literature and share the content.
15.	LIVE LEARNING 1. Prepare student for live learning. 2. Study activities through powerful observation. 3. Make them aware and to form a habit to Learn at any place, any time & from any person.

NOTES:

1. Term work report content of each experience should also include following.
 - a) Experience description/ data and objective.
 - b) A skill which is/are expected to be developed in student after competition of experience.
 - c) Drawing of experience / set up with labels / nomenclature to carry out the experience.
 - d) The specification of machine / equipment / devices / tools / instruments/items / elements which is / are used to carry out and to check experience.
 - e) Process parameters / set up settings values applied to carry out experience
 - f) Steps / process description to execute the experience.
 - g) Observation

- h) Information on resented machine / equipment / devices / tools/ instrument/ item available. In market to carry out the experience.
- i) Special / additional notes or remarks.
- 2. Term work report of student of regular more should exclude distance learning manual, photocopy, printed content, etc. focus should be on developing the term work as original efforts of student.
- 3. Term work also include experience logbook duly certified by subject teacher.

F - 401 INSTRUMENTATION CONTROL & QUALITY ASSURANCE

Sr.No.	BOOK NAME	AUTHOR
1.	Mechanical Measurement & Instrumentation	R.K.Rajput & S.K.Kataria & Sons
2.	Engg. Metrology	R.K.Jain
3.	Mech. Measurement	Dr.D.S.Kumar
4.	A Text Book Of Metrology	M.Mahajan & Dhanpatrai & Sons
5.	Distance Learning Mode	
6.	Total Quality Management	K.C.Arora
7.	Mech.Measurement	R.K.Jain