# Government Polytechnic Mumbai

## *Department of Instrumentation Engineering*

# P-19 Curriculum

# Semester- I

(Course Contents)

# GOVERNMENT POLYTECHNIC MUMBAI

**(**Academically Autonoums Instititute,  Government of Maharashtra)
**Teaching and Examination Scheme (P19)**
**With effect from AY 2019-20**

**Programme: Diploma in Instrumentation Engineering (Sandwich Pattern)**                    **Term / Semester - I**

| Course Code | Course Title | Teaching Hours/Contact Hours | | | | Credits | Examination Scheme (Marks) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | | | | | | |
| | | L | P | TU | Total | | TH | TS1 | TS2 | PR | OR | TW | Total |
| HU19101 | Communication skill | 2 | 2 | -- | 4 | 4 | 60 | 20 | 20 | 25* | -- | 25 | 150 |
| SC19101 | Basic  Physics | 3 | 2 | -- | 5 | 5 | 60 | 20 | 20 | 25* | -- | 25 | 150 |
| SC19109 | Basic Mathematics | 4 | -- | -- | 4 | 4 | 60 | 20 | 20 | -- | -- | -- | 100 |
| IS19201 | Principles of measurement | 3 | 2 | -- | 5 | 5 | 60 | 20 | 20 | 50 | -- | 25 | 175 |
| IS19202 | Instrumentation  Workshop Practice | -- | 4 | -- | 4 | 4 | -- | -- | -- | -- | -- | 50 | 50 |
| WS19201 | Workshop Practice | -- | 4 | -- | 4 | 4 | -- | -- | -- | -- | -- | 50 | 50 |
| IS19309 | Libre office suite writer and draw (Spoken Tutorial) | -- | 4# | -- | 4# | 4 | -- | -- | -- | -- | -- | -- | -- |
| | **Total** | 12 | 18 | -- | 30 | 30 | 240 | 80 | 80 | 100 | -- | 175 | 675 |
| Student Centered Activity(SCA) | | | | | | **05** | | | | | | | |
| Total Contact Hours | | | | | | **35** | | | | | | | |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment)
    * Indicates assessment by External Examiner else internal assessment,  # indicates Self, on- line learning Mode, @ indicates on line examination
Note:        Duration of Examination--TS1&TS2 -1 hour , TH- 2:30 hours, PR/OR – 3 hours per batch ,  SCA- Library - 1 hour, Sports- 2 hours, Creative Activity-2 hours
        Self, on- line learning Mode through MOOCS /Spoken Tutorials / NPTEL / SWAYAM / FOSSEE etc.


Coordinator,                              In-Charge                              Head of Department              Principal
Curriculum Development,        Curriculum Development Cell        Department of   Instrumentation Engg.
Department of Instrumentation Engg.

| Programme: **Diploma in CE/ME/IT/CO/IS/EE/EC/LG/LT (Sandwich pattern)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code: HU19101 | | | | Course Title: Communication Skills | | | | | | |
| Compulsory / Optional: Compulsory | | | | | | | | | | |
| Teaching Scheme and Credits | | | | Examination Scheme | | | | | | |
| L | P | TU | Total | TH (2:30 Hrs) | TS1 (1 Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| **02** | **02** | -- | **04** | **60** | **20** | **20** | **25\*** | -- | **25** | **150** |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test ,  # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill-test are to be conducted. First skill test at midterm and second skill test at the end of the term

**Rationale:**

Communication skills play a vital and decisive role in career development. In this age of globalization, competition is tough. Hence effective communication skills are important. The subject, Communication Skills introduces basic concepts of communication. It also describes the verbal, non-verbal modes and techniques of oral & written communication.

In this context, it will help the engineering diploma students to select and apply the appropriate methods of communication in various situations and business communication. Students are also required basics of communication and use of different skills.

This course will guide and direct to develop a good personality and improve communication skills. It will enable the students to utilize the skills necessary to be a competent communicator.

**Course Outcomes:** Student should be able to

| CO1 | Apply proper communication technique to cope up with the challenges of the modern world. |
|---|---|
| CO2 | Interpret feedback at various situations by using appropriate body language and avoid the barriers in effective communication. |
| CO3 | Able to participate in Group Discussion and Acquire the practical knowledge of an interview. |
| CO4 | Able to develop PowerPoint Presentation and Business correspondence. |
| CO5 | Write letters, circulars, memos, notices, reports and communicate effectively in written communication. |

**Course Content Details:**

| Unit No | Topics / Sub-topics |
|---------|---------------------|
| 1 | **Introduction to Communication**<br><br>1.1 Elements of Communication<br>1.2 Communication Cycle<br>1.3 Types of communication<br>1.4 Definition and Types of Barriers-<br>    a) Mechanical<br>    b) Physical<br>    c) Language<br>    d) Psychological<br>1.5 How to overcome Barriers<br><br>**Course Outcome: CO1     Teaching Hours :6 hrs     Marks: 14 (R- 2, U-4,  A-8)** |
| 2 | **Non- verbal Communication**<br><br>2.1 Meaning and Importance of Non-verbal Communication<br>2.2 Body Language<br>2.3 Aspects of Body Language<br>2.4 Graphic language<br><br>**Course Outcome: CO2     Teaching Hours :6 hrs     Marks: 12 (R- 4, U-4,  A-4)** |
| 3 | **Group Discussion and Interview Skills**<br><br>3.1 Need and Importance of Group Discussion<br>3.2 Use of Knowledge and Logical sequence.<br>3.3 Types of Interview<br>3.4 Preparing for an Interview<br><br>**Course Outcome: CO3     Teaching Hours :6 hrs     Marks: 10 (R-2, U-4,  A-4)** |
| 4 | **Presentation Skills**<br><br>4.1 Presentation Skills - Tips for effective presentation<br><br>4.2 Guidelines for developing PowerPoint presentation<br><br>**Course Outcome: CO4     Teaching Hours :4 hrs     Marks: 08 (R- 2, U-2,  A-4)** |
| 5 | **Business Correspondence**<br><br>5.1 Office Drafting – a) Notice b) Circular c) Memo<br>d) Email-writing.<br><br>5.2 Job Application with resume.<br><br>5.3 Business Letters – a) Enquiry b) Order c) Complaint<br><br>5.4 Report Writing – a) Fall in Production b) Accident Report<br><br>**Course Outcome: CO5     Teaching Hours: 8 hrs     Marks: 16 (R- 4, U-4,  A-8)** |

**Suggested Specifications Table (Theory):**

| Unit No | Topic Title | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | **Introduction to Communication** | 2 | 4 | 8 | 14 |
| 2 | **Non- verbal Communication** | 4 | 4 | 4 | 12 |
| 3 | **Group Discussion and Interview Skills** | 2 | 4 | 4 | 10 |
| 4 | **Presentation Skills** | 2 | 2 | 4 | 8 |
| 5 | **Business Correspondence** | 4 | 4 | 8 | 16 |
| | **Total** | **14** | **18** | **28** | **60** |

**List of experiments: Total 10experiments(or turns) out of 15experiments(or turns)**

| Sr. No. | Unit No | CO | List of Experiments | Hours |
|---|---|---|---|---|
| 1 | 1 | CO1, CO4 | Conversation between students on various situations. | 02 |
| 2 | 3 | CO2, CO4 | Non- Verbal Communication. | 02 |
| 3 | 3 | CO3, CO4 | Group Discussion | 02 |
| 4 | 4 | CO3, CO4 | Mock Interview | 02 |
| 5 | 5 | CO4, CO5 | Business Communication a) Advertisement, Tender, Diary writing. b) Job Application with Resume. | 02 |
| 6 | 1 | CO1 | Communication Barriers | |
| 7 | 5 | CO5 | Business Letters – a) Enquiry b)Order c)Complaint | |
| 8 | 4 | CO1, CO4 | Speeches- a) Welcome Speech   b) Farewell Speech c) Vote of Thanks | 02 |
| 9 | 5 | CO5 | Report Writing – a) Fall in Production b) Accident Report | 02 |
| 10 | All | CO4 | Showing Videos on different types of Communication. | 02 |
| 11 | | CO1 | *Articles | 02 |
| 12 | | CO1 | *Preposition and Conjunction | 02 |
| 13 | | CO1 | *Direct Indirect Speech | 02 |
| 14 | | CO1 | *Change the voice | |
| 15 | | CO1 | *Vocabulary Building | |
| | | | **Total** | **30** |

**Note: Experiments No. 1 to 10 are compulsory and should map all units and Cos. Remaining 5 experiments are to be perform on the importance of topic. .* This experiments will be performed in practical hours only.**

**References/ Books:**

| Sr. No. | Title | Author, Publisher, Edition and Year Of publication | ISBN |
|---|---|---|---|
| 1 | Communication Skills | Joyeeta Bhattacharya - Reliable Series | 9780000176981 |
| 2 | Communication Skills | Sanjay Kumar, PushpaLata- Oxford University Press | 978-0199488803 |
| 3 | Successful presentation Skills | Andrew Brad bury- The Sunday Times | 9780749456627 |

**E-References:**

1. Website: www.mindtools.com/page8.html-99k
2. Website:www.inc.com/guides/growth/23032.html-4
3. Website: www.khake.com/page66htm/-72k
4. Website: www.BM Consultant India Consultant India.Com
5.  https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-English
6. MYCBSEGUIDE
7.Website: www.letstak.co.in

**CO Vs PO and CO Vs PSO Mapping (Civil Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | |

**CO Vs PO and CO Vs PSO Mapping (Mechanical Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 1 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | 1 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 1 |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 1 |

**CO Vs PO and CO Vs PSO Mapping (Electronics Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | | |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | | |

**CO Vs PO and CO Vs PSO Mapping (Electrical Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 3 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | | 3 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | | 3 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | | 2 |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | | | |

**CO Vs PO and CO Vs PSO Mapping (Instrumentation Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 2 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | | 2 |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | | |

**CO Vs PO and CO Vs PSO Mapping (Computer Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 1 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | | 2 | |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | | 2 | |

**COVs PO and CO Vs PSO Mapping (Information Technology)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 1 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 1 |  | 2 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 |  |  |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 |  |  |

**CO Vs PO and CO Vs PSO Mapping (LG/LT Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 |  | 2 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 |  | 2 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 1 | 2 |
| CO4 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 |  | 2 |
| CO5 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 |  | 2 |

**Industry Consultation Committee:**

| Sr. No | Name | Designation | Institute/Organisation |
|--------|------|-------------|------------------------|
| 1 | Neelamkumar R. Sawant | State Head Technical Services for (Maharashtra and Goa) | JSW Cement ltd. Mumbai Head Office |
| 2 | Ms Shilpa D. Khune | Corporate Consultant Trainer | Mahindra Pride Classroom |
| 3 | Mrs. S.S. Kulkarni | Lecturer in English | Government Polytechnic, Pune. |
| 4 | Mrs. K.S.Pawar | Lecturer in English | Government Polytechnic, Mumbai |
| 5 | Mrs. N.N.Dhake | Lecturer in English | Government Polytechnic, Mumbai |

Curriculum Development,  Head of Department
Department of Science and Humanities  Department of Science and Humanities

I/C, Curriculum Development Cell  Principal

| Programme: **Diploma in IS/EE (Sandwich pattern)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

| Course Code: SC19101 | Course Title: Basic Physics |
|---|---|

Compulsory / Optional: Compulsory

| Teaching Scheme and Credits | | | | Examination Scheme | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| L | P | TU | Total | TH (2:30 Hrs) | TS1 (1 Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| **03** | **02** | **--** | **05** | **60** | **20** | **20** | **25\*** | -- | **25** | **150** |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill-test are to be conducted. First skill test at midterm and second skill test at the end of the term

**Rationale:**

The subject is included under the category of science. The special feature of the subject is to develop the laboratory skill using principles of scientific phenomenon. This course will serve to satisfy the need of the technical students for their development in technical field. The course is designed by selecting the topics which will develop intellectual skills of the students and will guide students to solve broad based engineering problems. Ultimately the focus of the course is to develop psychomotor skills in the students.

**Course Outcomes:** Student should be able to

| CO1 | State the different physical quantities, identify the proper unit of it and to estimate error in the measurement of physical quantities. |
|---|---|
| CO2 | Apply laws of motion in various engineering applications. |
| CO3 | Create awareness about the properties and application of light, LASER, Ultrasonic waves, sound waves and nanotechnology in engineering field. |
| CO4 | Identify the physical properties of the various materials such as elasticity, viscosity. |

**Course Content Details:**

| Unit No | Topics / Sub-topics |
|---|---|
| 1 | **Units and Measurements**<br>1.1 Fundamental Physical quantities, examples.<br>1.2 Derived physical quantities, examples.<br>1.3 Definition and requirements of unit<br>1.4 System of units, C. G. S., M. K. S. and S. I. units.<br>1.5 Rules to write the unit and conventions of units and Significant figures, rules to write significant figures.<br>1.6 Error – Definition, types of errors and estimation of errors.<br>1.7 Numerical<br><br>**Course Outcome: CO1**     **Teaching Hours: 6 hrs**     **Marks: 08 (R- 2, U-2, A-4)** |

| | |
|---|---|
| **2** | **Motions**<br><br>2.1 Linear motion –Definition – distance, displacement, velocity, acceleration, retardation, equation of motions, acceleration due to gravity and equation motion under gravity, numerical<br><br>2.2 Periodic motions: a) Oscillatory motion, b) Vibratory motion, c) S.H.M. d) Circular motion. (only definition and examples), terms related to S.H.M.: Definition: Time period, frequency, amplitude, wavelength, and phase<br><br>2.3 Angular motion:<br>a) Definition: angular motion, Uniform circular motion, Radius vector, linear velocity, Angular velocity, Angular acceleration,<br>b) Relation between linear velocity and angular Velocity(derivation), Radial or centripetal and acceleration, Three equations of motion (no derivations), Centripetal and Centrifugal force, examples applications.<br><br>**Course Outcome: CO2     Teaching Hours: 10 hrs,     Marks: 10 (R- 2 , U- 4 , A- 4 )** |
| **3** | **Modern Physics**<br>3.1 Photo Electricity<br>   Concept of quantum theory of light, Einstein's Photoelectric equation, Characteristics of photo<br>   electric effect, application of photo electric effect<br>3.2 LASER<br>  3.2.1  LASER introduction<br>  3.2.2  Properties of laser<br>  3.2.3  Spontaneous and stimulated emission,<br>  3.2.4  Population inversion, Optical pumping.<br>  3.2.5  Applications of LASER<br><br>**Course Outcome: CO3     Teaching Hours: 8 hrs,     Marks: 10 (R- 2 , U- 4 , A- 4 )** |
| **4** | **Optics and Ultrasonic Waves**<br>4.1 Optics:<br>   4.1.1 Revision of reflection and refraction of light.<br>   4.1.2 Laws of refraction, Snell's law.<br>   4.1.3 Determination of refractive index.<br>   4.1.4 Dispersion, dispersive power, Prism formula ( derivation)<br>   4.1.5 Numerical<br>4.2 Ultrasonic Waves<br>   4.2.1 Ultrasonic waves and infrasonic waves.<br>   4.2.2 Audible range of soundwave<br>   4.2.3 Properties of ultrasonic wave.<br>   4.2.4 Applications<br><br>**Course Outcome: CO3     Teaching Hours :6 hrs     Marks: 10 (R- 2 , U- 4 , A-4 )** |
| **5** | **Nanotechnology**<br>5.1 Introduction to nanotechnology.<br>5.2 Definition of nanoscale, nano meter and nanoparticles, nanotechnology.<br>5.3 Definition and examples of nanostructured materials.<br>5.4 Applications of nanotechnology in different fields -<br>    a) electronics, b) automobile, c) medical, d) textile, |

| | |
|---|---|
| | e) cosmetics, f) environmental, g) space and defence<br><br>**Course Outcome: CO3     Teaching Hours :4 hrs        Marks: 8 (R- 2 , U-2 , A-4 )** |
| **6** | **General Properties of Matter**<br>6.1 Elasticity:<br>   6.1.1 Deformation, deforming force, internal restoring force, Elastic, plastic and rigid substances,<br>        their examples<br>   6.1.2 Definition of elasticity, stress, strain and its types.<br>   6.1.3 Hooke's Law and elastic limit.<br>   6.1.4 Stress versus Strain diagram, yield point, breaking point<br>   6.1.5 Definition Young's Modulus, bulk modulus and modulus of rigidity relation among them.<br>   6.1.6 Factor of safety.<br>   6.1.7 Applications of elasticity.<br>   6.1.8 Numerical<br>6.2 Viscosity :<br>   6.2.1 Concept and Definition of viscosity, velocity gradient.<br>   6.2.2 Newton's law of viscosity, Co-efficient of viscosity, unit of viscosity<br>   6.2.3 Stoke's law, terminal velocity, derivation of Stoke's formula.<br>   6.2.4 Streamline flow, turbulent flow, critical velocity, examples.<br>   6.2.5 Reynold's number and its significance.<br>   6.2.6 Applications of viscosity<br>   6.2.7 Numerical<br><br>**Course Outcome: CO4     Teaching Hours : 11 hrs    Marks: 14 (R- 4 , U- 4 , A-6 )** |

**Suggested Specifications Table (Theory):**

| Unit No | Topic Title | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | **Units and Measurements** | 2 | 2 | 4 | 08 |
| 2 | **Motion** | 2 | 4 | 4 | 10 |
| 3 | **Modern Physics** | 2 | 4 | 4 | 10 |
| 4 | **Optics and Ultrasonic** | 2 | 4 | 4 | 10 |
| 5 | Nanotechnology | 2 | 2 | 4 | 08 |
| 6 | **General Properties of Matter** | 4 | 4 | 6 | 14 |
| | **Total** | **14** | **20** | **26** | **60** |

**List of experiments: Total 10 experiments(or turns) out of 15experiments(or turns)**

| Sr. No. | Unit No | CO | List of Experiments | Hours |
|---|---|---|---|---|
| 1 | 1 | CO1 | To know your Physics laboratory and Use of Scientific Calculator | 02 |
| 2 | 1 | CO1 | To measure the dimensions of given objects and to determine their volume using Vernier caliper | 02 |
| 3 | 2 | CO2 | To determine Acceleration due to gravity by simple pendulum | 02 |
| 4 | 3 | CO3 | To study photoelectric effect by using photo cell | 02 |
| 5 | 4 | CO3 | To determine refractive index by pin method | 02 |
| 6 | 6 | CO4 | To determine coefficient of viscosity of liquid by Stokes' method | 02 |
| 7 | 3 | CO1 | To measure the dimensions of given objects and to determine their volume using micrometer screw gauge. | 02 |
| 8 | 2 | CO2 | To determine stiffness constant by using helical spring | 02 |
| 9 | 3 | CO3 | To study projectile motion | 02 |
| 10 | 4 | CO3 | To plot the characteristics of photo cell. | 02 |
| 11 | 4 | CO3 | Experiments on LASER | 02 |
| 12 | 3 | CO3 | Demonstration on spectrometer | 02 |
| 13 | 5 | CO4 | To study Engineering applications of Nanotechnology | 02 |
| 14 | 6 | CO4 | To determine Young's modulus of elasticity of wire using Young's apparatus. | 02 |
| 15 | ALL | CO1 | Showing Video on different applications related to units, | 02 |
| | | **Total** | | **30** |

**Note: Experiments No. 1 to 5 (or 6) are compulsory and should map all units and Cos. Remaining 4 experiments are to be perform on the importance of topic.**

**References/ Books:**

| Sr. No. | Title | Author, Publisher, Edition and Year Of publication | ISBN |
|---|---|---|---|
| 1 | Applied Physics | Manikpure & Deshpande S.Chand & company | 978-8121919548 |
| 2 | Applied Physics | B.G.Bhandarkar, Vrinda Publication | 0071779795 |
| 3 | Optics & Optical Fibres | Brijlal Subhramanyan | 978-3662527641 |
| 4 | Engineering Physics | Gaur and S.L. Gupta S.Chand& Company | 0-07-058502 |
| 5 | Physics | Resnick and Halliday Tata McGraw Hills | 978-0-071755487-3 |
| 6 | Physics part I& II | H.C. Varma | 9788177091878 |
| 7 | Properties of Matter | D.S. Mathur | 978-8121908153 |

**E-References:**
1. www. Physics.org
2. www.ferrofphysics.com
3. www.physicsclassroom.com
4. http;//hperphysics.phastr.gsu.edu/hbase/hph.htm
5. www.youtube/physics
6. www.sciencejoywagon.com/physicszone
7. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-physics
8. MYCBSEGUIDE
9. https://ndl.iitkgp.ac.in/

**CO Vs PO and CO Vs PSO Mapping (Electrical Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | 2 | | | 1 | 1 | | 1 |
| CO2 | 3 | | | | | | 1 | | | |
| CO3 | 3 | | | | 1 | | 1 | | 1 | 1 |
| CO4 | 3 | | | 2 | 1 | | 1 | 1 | 1 | 1 |

**CO Vs PO and CO Vs PSO Mapping (Instrumentation Engineering)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | 2 | | | 1 | 2 | |
| CO2 | 3 | | | | | | 1 | 1 | |
| CO3 | 3 | | | | 1 | | 1 | 2 | |
| CO4 | 3 | | | 2 | 1 | | 1 | 1 | |

**Industry Consultation Committee:**

| Sr. No | Name | Designation | Institute/Organisation |
|---|---|---|---|
| 1 | Mr. Rajesh Masane | Sr. Engineer | L&T Mumbai |
| 2 | Mrs. B. J. Choudhary | Lecturer in Physics | Govt. Polytechnic Thane |
| 3 | Mrs S.A. Thorat | Lecturer in Physics | Government Polytechnic, Mumbai |
| 4 | Dr. D.S. Nikam | Lecturer in Physics | Government Polytechnic, Mumbai |

Curriculum Development,                          Head of Department
Department of Science and Humanities      Department of Science and Humanities

I/C, Curriculum Development Cell              Principal
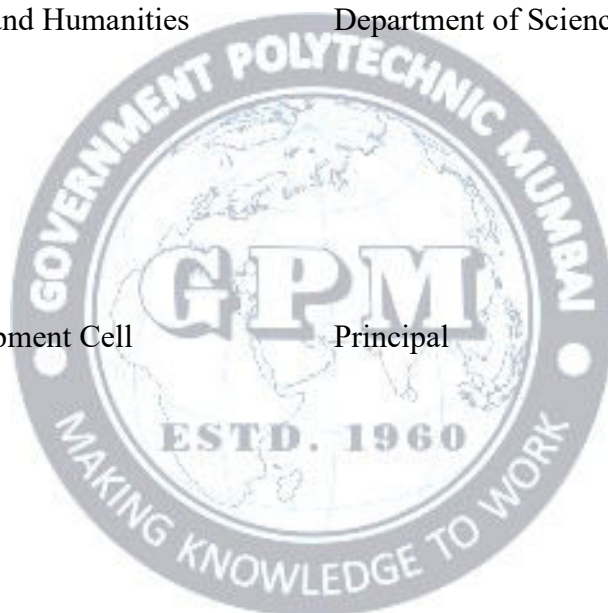
| Programme : **Diploma in CE/ME/IT/CO/EC/IS/EE(Sandwich Pattern)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code: SC19109 | | | | Course Title: Basic Mathematics | | | | | | |
| Compulsory / Optional: Compulsory | | | | | | | | | | |
| Teaching Scheme and Credits | | | | Examination Scheme | | | | | | |
| L | P | TU | Total | TH (2:30 Hrs) | TS1 (1Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| **04** | - | - | **04** | **60** | **20** | **20** | - | - | - | **100** |

Abbreviations: L- Theory Lecture,P-Practical,TU-Tutorial,TH- Theory Paper TS1&TS2- Term Tests,PR-Practical,OR-Oral,TW: Term Work (progressive assessment),* Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination. Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term.

**Rationale:**

This subject is kept under the branch of sciences. This subject intends to teach student basic facts ,concepts, principles, and procedure of mathematics as a tool to analyze engineering problems and as such lays down foundation for understanding the engineering and core technology subject.

**Course Outcomes:** Student should be able to

| CO1 | Identify the basic principles of mathematics about the field analysis of any engineering problem. |
|---|---|
| CO2 | Apply rules , concept and properties to solve the basic problems. |
| CO3 | Establish relation between two variables. |

**Course Content Details**:

| Unit No | Topics / Sub-topics |
|---|---|
| **1** | **Trigonometry:** <br> 1.1 Trigonometric ratios of allied angles, compound angles, multiple. angles (2A, 3A), Sub multiple angles <br> 1.2 Factorization and De-factorization Formulae <br> 1.3 Inverse Circular function (definition and simple problems). <br><br> **Course Outcome: CO1**    **Teaching Hours : 10 hrs**    **Marks: 10 (R- 4, U-4, A-2)** |
| **2** | **Vectors:** <br> 2.1 Definition of vector , position vector <br> 2.2 Algebra of vectors(Equality, addition ,subtraction and scalar multiplication) <br> 2.3 Dot (Scalar) product & Vector (Cross) product with properties. <br> **Course Outcome: CO3**    **Teaching Hours : 10 hrs**        **Marks: 10 (R- 2 , U-4 , A-4 )** |

| 3 | **Logarithms:**<br>3.1  Definition of logarithm<br>3.2  Laws of logarithm<br>3.3  simple examples based on laws.<br><br>**Course Outcome:CO2**        **Teaching Hours : 10hrs**              **Marks:10(R-4 , U- 4 , A-2 )** |
|---|---|
| 4 | **Probability :**<br>4.1Definition of random experiment , sample space, event, occurance of event and types  of<br>     event  ( Impossible , mutually exclusive , exhaustive ,equally likely )<br>4.2  Definition of Probability<br>4.3   Addition & Multiplication Theorems of probability without proof , simple examples<br><br>**Course Outcome: CO1**        **Teaching Hours :10hrs**        **Marks:10 (R-4,  U- 4  , A-2 )** |
| 5 | **Determinants:-**<br>5.1 Definition of Determinant<br>5.2 Expansion of Determinant of order 2X3<br>5.3 Crammer's rule to solve   simultaneous  equations in 3 unknowns<br><br>**Course Outcome: CO2**        **Teaching Hours :10 hrs**    **Marks:10 (R- 2  , U-4   , A-4 )** |
| 6 | **Matrices:**<br>6.1  Definition of  a matrix of order m x n<br>6.2   Types of matrices<br>6.3   Algebra of matrices - equality, addition, subtraction ,multiplication & scalar<br>       multiplication.<br>6.4  Transpose of matrix.<br>6.5   Minor , co-factor of an element.<br>6.6   Adjoint & inverse of a matrix by adjoint method.<br>6.7   Solution of a simultaneous   equations by matrix inversion method.<br><br>**Course Outcome: CO3**        **Teaching Hours : 10 hrs**        **Marks: 10  (R- 2 , U- 4  , A- 4 )** |

**Suggested Specifications Table (Theory):**

| Unit No | Topic Title | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total |
| 1 | **Trigonometry** | 04 | 04 | 02 | 10 |
| 2 | **Vectors** | 02 | 04 | 04 | 10 |
| 3 | **Logarithms** | 04 | 04 | 02 | 10 |
| 4 | **Probability** | 04 | 04 | 02 | 10 |
| 5 | **Determinants** | 02 | 04 | 04 | 10 |
| 6 | **Matrices** | 02 | 04 | 04 | 10 |
| | **Total** | 18 | 24 | 18 | 60 |

**References/ Books:**

| Sr. No. | Title | Author, Publisher, Edition and Year Of publication | ISBN |
|---|---|---|---|
| 1 | Mathematics for Polytechnic Students | S.P.Deshpande, Pune Vidyavardhini Graha Prakashan | - |
| 2 | Mathematics for Polytechnic Students ( Volume I ) | H.K.Dass, S.Chand Prakashan | 9788121935241 |
| 3 | Companions to Basic Maths | G.V.Kumbhojkar, Phadke Prakashan | 10-B07951HJDQ 13-B07951HJDQ |
| 4 | Applied Mathematics | N.Raghvendra Bhatt late, Tata McGraw Hill Publication Shri R Mohan Singh | 9789339219567, 9339219562 |

**E-References:**

1. www.math-magic.com
2. www.Scilab.org/-SCI Lab
3. www.mathworks.com/Products/Matlab/-MATLAB
4. www.wolfram.com/mathematica/-Mathematica
5. https://www.khanaacademy.org/math?gclid=CNqHuabCys4CFdoJaAoddHoPig
6. www.dplot.com/-Dplot
7. www.allmathcad.com/-Math CAD
8. www.easycalculation.com
9. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-maths
10. MYCBSEGUIDE

**CO Vs PO and CO Vs PSO Mapping (CIVIL ENGINEERING)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | 2 | | | 1 | 1 | | 1 |
| CO2 | 3 | 2 | | | | | 1 | 1 | | 1 |
| CO3 | 3 | | | 2 | | | 1 | 1 | | 1 |

**CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | 2 | | | 1 | 1 | |
| CO2 | 3 | 2 | | | | | 1 | 1 | |
| CO3 | 3 | | | 2 | | | 1 | 1 | |

**CO Vs PO and CO Vs PSO Mapping (COMPUTER ENGINEERING)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | | | 2 | | | 1 | 1 | | |
| CO2 | 3 | 2 | | | | | 1 | 1 | | |
| CO3 | 3 | | | 2 | | | 1 | 1 | | |

**CO Vs PO and CO Vs PSO Mapping (INFORMATION TECHNOLOGY)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | | | 2 | | | 1 | 1 | | 1 |
| CO2 | 3 | 2 | | | | | 1 | 1 | | 1 |
| CO3 | 3 | | | 2 | | | 1 | 1 | | 1 |

**CO Vs PO and CO Vs PSO Mapping (ELECTRONICS ENGINEERING)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | | | 2 | | | 1 | | 1 | 1 |
| CO2 | 3 | 2 | | | | | 1 | | 1 | 1 |
| CO3 | 3 | | | 2 | | | 1 | | 1 | 1 |

**CO Vs PO and CO Vs PSO Mapping (ELECTRICAL ENGINEERING)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | | | 2 | | | 1 | | 1 | |
| CO2 | 3 | 2 | | | | | 1 | | 1 | |
| CO3 | 3 | | | 2 | | | 1 | | 1 | |

**CO Vs PO and CO Vs PSO Mapping ( INSTRUMENTATION ENGINEERING)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO1 | 3 | | | 2 | | | 1 | 1 | 1 |
| CO2 | 3 | 2 | | | | | 1 | 1 | 1 |
| CO3 | 3 | | | 2 | | | 1 | 1 | 1 |

**Industry Consultation Committee:**

| Sr. No | Name | Designation | Institute/Organisation |
|---|---|---|---|
| 1 | Neelamkumar R. Sawant | State Head Technical Services for (Maharashtra | JSW Cement ltd. Mumbai Head Office |
| 2 | Mrs. Deepawali S. kaware | Lecturer in Mathematics | Government polytechnic Vikaramgad |
| 3 | Mr. A.S.Patil | Lecturer in Mathematics | Government polytechnic Mumbai |
| 4 | Mr.V.S.Patil | Lecturer in Mathematics | Government polytechnic Mumbai |

Coordinator,                                         Head of Department
Curriculum Development,              Department of Science and Humanities
Department of Science and Humanities

I/C, Curriculum Development Cell                    Principal
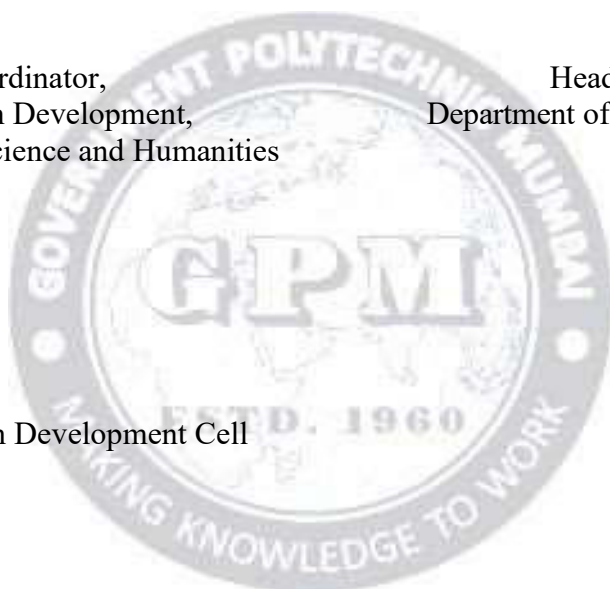
| Programme : **Diploma in Instrumentation Engineering (Sandwich Pattern)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code: IS19201 | | | | Course Title: Principles of Measurement | | | | | | |
| Compulsory / Optional:  Compulsory | | | | | | | | | | |
| Teaching Scheme and Credits | | | | Examination Scheme | | | | | | |
| L | P | TU | Total | TH (2:30 Hrs) | TS1 (1 Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| **3** | **2** | **-** | **5** | **60** | **20** | **20** | **50** | -- | **25** | **175** |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test ,   # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

## Rationale:

Instrumentation is defined as the art and science of measurement and control of physical variables within a production or manufacturing area. The physical variables like temperature, pressure, flow rate, level, displacement, force, pH, humidity, and etc. are measured in industries to monitor and control the overall operation of plant. For conversion of these physical quantities into electrical forms, various types of transducers are used. Hence it is essential to study the conversion/ transduction principles. This course mainly deals with study of various transduction principles as well as characteristics of measuring instruments.

## Course Outcomes: Student should be able to

| CO1 | Discuss concept of metrology and measurement. |
|---|---|
| CO2 | Define the performance characteristics of measuring instruments. |
| CO3 | Demonstrate the transduction principles of different transducers. |
| CO4 | Explain measurement of given process variable using different transducers. |

## Course Content Details:

| Unit No | Topics / Sub-topics |
|---|---|
| 1 | **Introduction to Metrology and Measurement**<br>1.1  Definitions of Metrology, Types of Metrology<br>1.2  Definition of Measurement , Instrumentation<br>1.3  Significance of Measurement .Methods of  Measurements,Generalized  Measurement System .Applications of Measurement Systems<br><br>**Course Outcome: CO1**        **Teaching Hours :  4 hrs**        **Marks: 4  (R-2 , U-2,  A-0)** |
| 2 | **Instrument's   Performance Characteristics**<br>2.1  Classification of Instruments :<br>        Active and Passive instruments ,Null-type and  Deflection-type instruments ,<br>        Analogue and Digital  instruments, , Smart instruments  & non smart instruments<br>2.2  Types of Performance Characteristics<br>2.3  Definitions-Static Characteristics of Instruments: Accuracy, Precision, calibration, Range and |

| | |
|---|---|
| | span ,Linearity, Sensitivity , Repeatability & Reproducibility, Resolution & Threshold, Drift, Hysteresis band, Dead zone.( Definition only) |
| | 2.4 Definitions-Dynamic Characteristics of Instruments: Speed of Response, Dynamic Error, Fidelity. |
| | 2.5 Errors in Measuring Instruments |
| |       2.5.1 Types of Errors |
| |       2.5.2 Sources of Errors |
| |       2.5.3 Reduction of Errors |
| | **Course Outcome: CO2**      **Teaching Hours :10 hrs**      **Marks:12**    **(R-2 , U-6 , A-4 )** |
| **3** | **Transduction Principles of Sensors & Transducers** |
| | 3.1 Different Physical Variables Measured in Industries, Definitions of Sensor & Transducer and their difference, Classification of Transducers. |
| | **Principle of Operation, List of Examples & Applications of –** |
| | 3.2 Resistive transducers ( Potentiometer, RTD, Thermistor & LDR) & Piezo-resistive sensors |
| | 3.3 Capacitive transducers based on change in area of plates, change in distance between plates and change in dielectric between plates |
| | 3.4 Inductive transducers- |
| |     Self-generating type- Electromagnetic type, Electrodynamics type, and Eddy current type |
| |     Passive type- Variable Inductance type, Mutual Inductance type |
| | 3.5 Hall-effect sensors ,Piezoelectric transducers |
| | 3.6 Photoelectric sensors - Photo emissive, Photo conductive and Photovoltaic |
| | 3.7 Ultrasonic transducers, Radar sensors. |
| | **Course Outcome: CO3**      **Teaching Hours :10 hrs**      **Marks:14**    **(R-4 , U-6 , A-4 )** |
| **4** | **Principles of Pressure Measurement** |
| | 4.1 Pressure -Definition, Units of Pressure, Pascal's Law |
| | 4.2 Absolute, Gauge, Atmospheric, Vacuum, and Differential Pressures. |
| | **Principles of Operation and Applications of –** |
| | 4.3 Barometer |
| | 4.4 Manometers- Piezometer , U-tube manometer, Single limb manometer |
| | 4.5 Bourdon tube- C type, Bellows & Diaphragm |
| | **Course Outcome: CO4**      **Teaching Hours :6 hrs**      **Marks:8**    **(R-0 , U-4 , A- 4)** |
| **5** | **Principles of Flow Measurement** |
| | 5.1 Types of fluid flows, Rate of flow or discharge(Q), Continuity equation |
| | 5.2 Bernoulli's equation for ideal and real fluids and applications |
| | **Principle of Operation and Applications of –** |
| | 5.3 Venturimeter, Orifice Meter, Rotameter |
| | **Course Outcome:CO4**      **Teaching Hours :08hrs**      **Marks:12**    **(R- 2 , U-6 , A- 4 )** |
| **6** | **Principle of Temperature Measurement** |
| | 6.1 Difference between heat and temperature, temperature Scale. Different units of temperature measurement and their conversion |
| | 6.2 Modes of heat transfer, Thermal conductivity |
| | **Principle of Operation of –** |
| | 6.3 Thermal expansion thermometers (liquid thermometer, Bimetallic Strip) |

| | 6.4 Thermoelectric thermometers – (Seebeck, Peltier, and Thomson effects)- principle of Thermocouple |
|---|---|
| | **Course Outcome:CO4**    **Teaching Hours : 7 hrs**    **Marks: 10**   (R- 2 , U-4 , A-4 ) |

**Suggested Specifications Table (Theory):**

| Unit No | Topic Title | R Level | U Level | A Level | Total Marks |
|---|---|---|---|---|---|
| | | | **Distribution of Theory Marks** | | |
| 1 | Introduction to Metrology and Measurement | 02 | 02 | -- | 04 |
| 2 | Instrument's Performance Characteristics | 02 | 06 | 04 | 12 |
| 3 | Transduction Principles of Sensors & Transducers | 04 | 06 | 04 | 14 |
| 4 | Principles of Pressure Measurement | -- | 04 | 04 | 8 |
| 5 | Principles of Flow Measurement | 02 | 06 | 04 | 12 |
| 6 | Principles of Temperature Measurement | 02 | 04 | 04 | 10 |
| | **Total** | **12** | **28** | **20** | **60** |

**List of experiments: Total 10 experiments (or turns) out of 15 experiments (or turns)**

| Sr. No. | Unit No | COs | Title of the Experiments | Hours |
|---|---|---|---|---|
| 1 | 1 | CO1 | To identify direct and indirect measuring instruments in the given lab | 2 |
| 2 | 2 | CO2 | To find an accuracy, precision, range and span of mechanical instruments (e.g. Level indicator). | 2 |
| 3 | 3 | CO3 | To verify the resistive transduction principle of transducer. | 2 |
| 4 | 4 | CO4 | To measure gauge pressure and differential pressure using U- tube manometer. | 2 |
| 5 | 5 | CO4 | To measure liquid flow rate using rotameter. | 2 |
| 6 | 6 | CO4 | Measurement of temperature by using temperature sensor. | 2 |
| 7 | 2 | CO2 | To find an accuracy, precision, range and span of electrical instruments (e.g. DMM- voltage, current and resistance). | 2 |
| 8 | 3 | CO3 | To verify the inductive transduction principle by converting displacement / velocity into voltage. | 2 |
| 9 | 4 | CO4 | To measure atmospheric pressure using barometer. | 2 |
| 10 | 5 | CO4 | To measure liquid flow rate using orifice meter. | 2 |
| 11 | 5 | CO4 | To measure liquid flow rate using venturi meter. | 2 |
| 12 | 3 | CO3 | To verify photo conductive principle by converting light intensity into resistance (LDR). | 2 |
| 13 | 3 | CO3 | To verify the capacitive transduction principle by converting liquid level into change in capacitance. | 2 |

| 14 | 4 | CO4 | Identify different pressure mechanical pressure transducer in lab. | 2 |
| 15 | 3 | CO3 | To verify the piezoelectric transduction principle applicable for only dynamic   measurement. | 2 |
| | | **Total** | | **30** |

**Note: Experiments No. 1 to 5 (or 6) are compulsory and should map all units and Cos.**
**Remaining 4 experiments are to be performing on the importance of topic.**

**References/ Books:**

| Sr. No. | Title | Author, Publisher, Edition and Year Of publication | ISBN |
|---|---|---|---|
| 1 | A Course in Electrical and Electronic Measurements and Instrumentation | A.K. Sawhney Dhanpat Rai and co, New Delhi.2015 | 9788177001006 |
| 2 | Measurement-And-Instrumentation-Principles-3rd-Edition1 | Alan S. Morris Butterworth-Heinemann, Oxford. 2001 | 9780750650816 |
| 3 | A TextBook of Fluid Mechanics and Hydraulic Machines (in S.I. Units) | Dr. R. K. Bansal Laxmi    Publication, New Delhi. 2018 | 9788131808153 |
| 4 | A Textbook on Heat Transfer | Dr. S.P. Sukhatme Universities Press (India) Fourth edition (2005) | 9788173715440 |
| 5 | Instrumentation System and devices | Rangan Mani Sharma Tata McGraw Hill | 9780074633502 |
| 6 | Industrial instrumentation and controls | S.K. Singh Tata McGraw Hill, New Delhi | 9780070262225 |

**E-References:**
1. https://www.youtube.com/ "type name of instrument"
2. http://www.vlab.co.in/
3. https://www.electronics-tutorials.ws/io/io_3.html
4. https://nptel.ac.in/course.html
5. https://www.slideshare.net/nsihag/transducers-17950953
6. https://en.wikipedia.org/wiki/Transducer

**CO Vs PO and CO Vs PSO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | 2 | 1 | - |
| CO2 | 3 | - | - | - | - | - | 3 | 2 | - |
| CO3 | - | - | 2 | 2 | - | - | 2 | 3 | - |
| CO4 | - | - | - | 2 | - | 1 | 2 | 3 | - |

**Industry Consultation Committee:**

| Sr. No | Name | Designation | Institute/Organisation |
|---|---|---|---|
| 1 | Mr. Pravin Nalavade | Associate Chief Engineer | Technip FMC, Chandivali |
| 2 | Mrs. V.K.Pawar | Lecturer in Instrumentation Engineering | Govt. Polytechnic Karad |
| 3 | Mr. U.B.Shinde | Lecturer in Instrumentation Engineering | Govt. Polytechnic Mumbai |
| 4 | Mrs. S.T. Shinde | Lecturer in Instrumentation Engineering | Govt. Polytechnic Mumbai |

Coordinator,                                                    Head of Department

Curriculum Development,                          Department of Instrumentation Engineering

Department of Instrumentation Engineering

I/C, Curriculum Development Cell                    Principal

*Principles of Measurement (IS19201)*            *(Approved copy)*            *( P19 Scheme)*

| Programme : **Diploma in Instrumentation Engineering (Sandwich Pattern)** |||||||||
|---|

| Course Code: IS19202 | Course Title: Instrumentation Workshop Practice |
|---|---|

| Compulsory / Optional: Compulsory |
|---|

| Teaching Scheme and Credits |||| Examination Scheme |||||||
|---|---|---|---|---|---|---|---|---|---|---|
| L | P | TU | Total | TH (2:30 Hrs) | TS1 (1 Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| -- | 4 | -- | 4 | -- | -- | -- | -- | -- | 50 | 50 |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

**Rationale:**

Instrumentation workshop practice will provide real industrial environment which helps students to develop technician skills related to instrumentation field. The course is designed to impart hands-on-skills in the field of electronics & instrumentation such as testing of electronic components, cables, connectors, soldering and de-soldering techniques, PCB making etc. This course is useful for students to build, test, maintain and troubleshoot simple electronic circuits on PCB.

**Course Outcomes:** Student should be able to

| CO1 | Select appropriate tools, components and instrument. |
|---|---|
| CO2 | Test the given electronic components. |
| CO3 | Perform the soldering and de-soldering with utmost safety. |
| CO4 | Develop PCB, assemble components and test the circuit. |

**Course Content Details:**

| Unit No | Topics / Sub-topics |
|---|---|
| 1 | **Tools**<br>1.1 Tools: Nose pliers, wire stripper, screwdrivers, allen keys, cutter, hand hacksaw, soldering iron, de-soldering pump, crimping tools (for RJ-45, RJ-11), and cable testers. (Free hand constructional sketches may be drawn on drawing sheet)<br>1.2 Multimeters: Need of Multimeter, Analog and digital Multimeter, Measurement of parameter using multimeter.<br><br>**Course Outcome: CO1** |
| 2 | **Switches, Cables and Connectors**<br>2.1 Types of switches: SPST, SPDT, Toggle, thumbwheel, rotary, slide, micro switch, membrane switch.<br>2.2 Cable: Flat, Ribbon, Co-axial, twisted pair, UTP, Fiber optic.<br>2.3 Connector Types: PCB edge connector, Berg (strip) connector, FRC connector, D-type, BNC, TNC, MCB, RJ-45, RJ-11, USB (A, B, mini, micro).<br><br>**Course Outcome: CO1** |

| 3 | **Component Testing**<br>3.1 Identification and testing of following components. Resistors, Capacitors, Inductors, Transformers, PN Junction Diode, Bipolar Junction Transistors (BJT), Filed Effect Transistors (FET), Unijunction Transistor (UJT), Metal Oxide Semiconductor FET (MOSFET), LED, 7- Segment Displays, SCR, DIAC, TRIAC.<br>3.2 Terminal identification and major specifications of component from its data sheet.<br><br>**Course Outcome: CO2** |
|---|---|
| 4 | **Soldering and De-soldering**<br>4.1 Soldering Basics: Solder joint: Dry solder joint, cold solder joint, Good and Bad solder joint, Soldering material, Soldering tools: Soldering Iron, soldering station.<br>4.2 De-soldering Technique: Tools used for de-soldering, De-solder Wick, De-solder Pump<br>4.3 Precaution during soldering and de-soldering.<br><br>**Course Outcome: CO3** |
| 5 | **PCB Making**<br>5.1 Types of PCB's: Glass Epoxy, paper phenolic, Single Sided, double sided, Selection and application of PCB's. Drawing electronic circuit, designing PCB layout and artwork. Use of paint, Templates, Pen.<br>5.2 Demonstration of PCB making equipments: Deep coating machine, UV exposure unit, Etching machine, dryer (oven) and scanner with lens. Drilling machine, Shearing machine. Developing negative film and making PCB.<br><br>**Course Outcome: CO4** |
| 6 | **Mini Project**<br>6.1 Selection and testing of components to be used in the mini project.<br>6.2 PCB layout and artwork design: Transfer the artwork on copper clad, Etching and drilling, mounting and soldering components.<br>6.3 Testing and fault finding of circuit, Wire harnessing and final assembly along with enclosure.<br><br>**Course Outcome: CO4** |

**Suggested Specifications Table (Theory): --NA---**

**List of experiments: Total 10 experiments (or turns) out of 15 experiments (or turns)**

| Sr. No. | Unit No | COs | Title of the Experiments | Hours |
|---|---|---|---|---|
| 1 | 1 | CO1 | To know Instrumentation Workshop Lab:<br>A) Demonstration for identification and use of tools. (Nose pliers, wire stripper, screwdrivers, allen keys, allen screw, cutter, hand hacksaw, soldering iron, de-soldering pump, crimping tools (for RJ-45, RJ-11), and cable testers.(4 Hours)<br>B) Prepare the sheet of free hand sketch of various tools used in Instrumentation Workshop and write their uses. (4 Hours) | 8 |
| 2 | 1 | CO1 | Multimeters:<br>(A) To identify analog and digital multimeters and to identify different range selection for AC/DC voltage/Current, Resistance, continuity, diode, transistor.<br>(B) To measure resistance, voltage and current using analog and digital multimeter. | 4 |
| 3 | 2 | CO1 | To identify and test various types of switches, cables and connectors (Lead identification, testing, uses). | 8 |

| | | | | |
|---|---|---|---|---|
| | | | (A) SPST, SPDT, Toggle, thumbwheel, rotary, slide, micro switch, membrane switch. (2 Hours)<br>(B) PCB edge connector, FRC connector, D-type, BNC, TNC, MCB, RJ-45, RS-232, USB connectors. (2 Hours)<br>(C) Flat, Ribbon, Co-axial, twisted pair, UTP. (2 Hours)<br>Prepare the chart for symbols with terminal identification, uses and testing procedures. (2 Hours) | |
| 4 | 3 | CO2 | To identity and test passive components available in your lab:<br>**Resistors**: Thick film and Thin film resistors, Network and Surface Mount Resistors, Variable Resistors, Special resistors e.g. thermistor, LDR.<br>**Capacitors**: Dielectric, Variable, Electrolytic: aluminium/tantalum, Film: radial/axial lead, Ceramic.<br>**Inductors**: Iron core, Ferrite core, Air core, bobbin based, torroidal, multilayer, film, variable, coupled.<br>(by color codes and with multimeter/LCR meter) | 4 |
| 5 | 4 | CO3 | Demonstration and practice of soldering and de-soldering technique. | 4 |
| 6 | 5&6 | CO4 | Mini project:<br>To prepare PCB (with layout, artwork designed by the student) for small electronic circuits.<br>Note: Mini project group may consist of 3-4 students. Student has to demonstrate the project and submit the project report. | 8 |
| 7 | 3 | CO2 | To identify and test Diode, LED, BJT, FET, UJT, MOSFET and 7- Segment display using multimeter. | 4 |
| 8 | 3 | CO2 | To identity and test DIAC, SCR and TRIAC using multimeter. | 2 |
| 9 | 4 | CO3 | To identity Solder joint, Dry and cold solder joint, good and bad solder joint, soldering material, soldering tools | 2 |
| 10 | 4 | CO3 | To perform soldering by soldering material & soldering tools. Precaution to be taken during de-soldering | 2 |
| 11 | 4 | CO3 | To perform De-soldering by De-solder Wick, De-solder Pump. Precaution to be taken during de-soldering | 2 |
| 12 | 5 | CO4 | Draw circuit schematic, layout and artwork using one of the PCB making software mentioned below. (Express PCB, Free PCB, EAGLE PCB, workbench etc). | 4 |
| 13 | 5 | CO4 | To identify different types of PCB. Teacher shall explain artwork design rules, types of PCB's: Glass Epoxy, Selection of PCB's, PCB layout and artwork design, Use of paint, Templates, Pen etc paper phenolic, Single Sided, double sided, Selection of PCB's, PCB layout and artwork design, Use of paint, Templates, Pen etc. | 4 |
| 14 | 5 | CO4 | To search information on different PCB making equipments. | 2 |
| 15 | 5 | CO4 | To identify different instruments/ equipments used in making PCB. | 2 |
| **Total** | | | | **60** |

**Note: Experiments No. 1 to 5 (or 6) are compulsory and should map all units and Cos. Remaining 4 experiments are to be performing on the importance of topic.**

**References/ Books:**

| Sr. No. | Title | Author, Publisher, Edition and Year Of publication | ISBN |
|---|---|---|---|
| 1 | Electronic Devices and Circuit: An Introduction | Mottershead Allen PHI Learning, New Delhi | 9788120301245 |
| 2 | Electronic Devices and Circuit Theory | Boylestead Robert, Louis Neshelsky Pearson Education, 10th edition | 9788131727003 |
| 3 | The Art of Electronics | Paul Horowitz Winfield Hill Cambridge University Press, New Delhi | 9780521370950 |
| 4 | Electronics Principles | Malvino, Albert Paul, David McGraw Hill Education | 9780073222776 |
| 5 | Principles of Electronics | Mehta V.K., Mehta Rohit S. Chand and Company | 9788121924504 |
| 6 | Basic Electronic Engineering | Baru V., Kaduskar R. , Gaikwad S.T. Dreamtech Press | 9789350040126 |
| 7 | Fundamentals of Electronic Devices and Circuits | David A. Bell Oxford University Press | 9780195425239 |
| 8 | A text book of Applied Electronics | Sedha R.S. S. Chand | 9788121904209 |

**E-References:**

1. http://www.alldatasheet.com
2. http://www.allelectronics.com
3. http://www.techniks.com
4. http://www.aplab.com
5. https://electronicsclub.info

**CO Vs PO and CO Vs PSO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | 1 | - | 1 | 2 | 3 | - |
| CO2 | 3 | - | 1 | 3 | - | - | 2 | 2 | - |
| CO3 | 1 | - | - | - | - | - | 3 | 1 | - |
| CO4 | - | 2 | 3 | - | - | - | 2 | 2 | - |

**Industry Consultation Committee:**

| Sr. No | Name | Designation | Institute/Organisation |
|---|---|---|---|
| 1 | Mr. Santosh Kamble | Proprietor | Saitronics, Kamothe Navi Mumbai |
| 2 | Mr. C.S.Tamkhane | Lecturer in Instrumentation Engineering | Govt. Polytechnic Pen |
| 3 | Mr. U.B.Shinde | Lecturer in Instrumentation Engineering | Govt. Polytechnic Mumbai |
| 4 | Mr. K.U.Dawane | Lecturer in Instrumentation Engineering | Govt. Polytechnic Mumbai |

Coordinator,                                        Head of Department

Curriculum Development,                      Department of Instrumentation Engineering

Department of Instrumentation Engineering

I/C, Curriculum Development Cell                    Principal
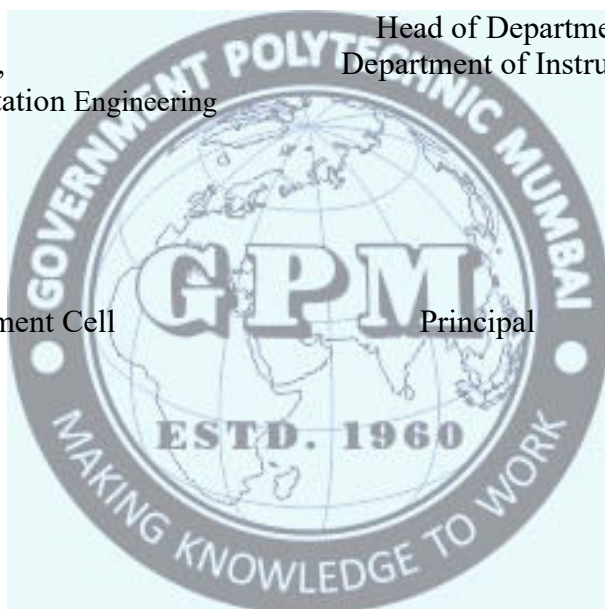
| Programme :  ME/CE/IS (Sandwich Pattern) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code: WS19201 | | | | Course Title:  Workshop Practice | | | | | | |
| Compulsory / Optional:   Compulsory | | | | | | | | | | |
| Teaching Scheme and Credits | | | | Examination Scheme | | | | | | |
| L | P | TU | Total | TH (2:30Hrs) | TS1 (1 Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| 0 | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 50 | 50 |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test ,  # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26.

**Rationale:**

Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops. The knowledge of basic shops like Wood working, Fitting, Welding, Plumbing and Sheet Metal shop is essential for technicians to perform their duties in industries. Irrespective of engineering stream, the use of workshop practices in day to day industrial as well domestic life helps to solve various minor but critical problems. Working in workshop develops the attitude of working in a group and the basis for safety awareness is created. This foundation course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing. The students are advised to undergo each skill experience with remembrance, understanding and application with special emphasis on attitude of enquiry to know why and how for the various instructions and practices imparted to them in each hop. Furthermore, the demonstration of CNC Machine will give feel of advancement in industry.

**Course Outcomes:** Student should be able to

| CO1 | Lay-outing of shop & Sketching of jobs, tools & equipment. |
|---|---|
| CO2 | Select appropriate tools, machinery, equipment and consumables for given application. |
| CO3 | Use & Operate hand tools, equipment and machinery in different shops. |
| CO4 | Prepare the simple jobs as per specification & drawing. |
| CO5 | Maintain workshop related tools, equipment and machineries. |

**Course Content Details:**

| Unit No | Topics / Sub-topics |
|---|---|
| 1 | **Introduction to workshop: -**<br>1.1 Workshop layout, Importance of various sections/shop of workshop, Types of jobs done in each shop.<br>1.2 Causes of accidents, general safety rules and work procedure in workshop, Safety signs and symbols, First Aid.<br>1.3 Fire, Causes of Fire, Basic ways of extinguishing the fire. Classification of fire, Firefighting |

| | |
|---|---|
| | equipment, fire Extinguishers and their types.<br>1.5  Issue and return system of tools, equipment and consumables.<br><br>**Course Outcome: CO1,CO2**                                  **Teaching Hours : 06** |
| **2** | **Smithy and Forging:-**<br>2.1  Sketching, understanding the specifications, materials, various applications and methods used in Smithy and Forging shop along with use of tools like anvil, hammers, Swage block, tongs, chisels, flatters etc;<br>2.2  Demonstration of Smithy and  Forging  operations like bending, setting down, bulging, Upsetting etc;<br>2.3  Preparation of smithy & forging, job.<br>2.4  Safety precautions & Personal Protective Equipments.<br><br>**Course Outcome: CO1,CO2,CO3,CO4,CO5**                    **Teaching Hours :10** |
| **3** | **Carpentry Section :-**<br>3.1  Types of wood and their applications.<br>3.2  Types of carpentry hardware's and their uses.<br>3.3  Sketching, understanding the specifications, materials, various applications and Methods used in Carpentry shop along with use of tools like saws, planner, chisels, Hammers, mallet, marking<br>3.4  Demonstration of carpentry operations such as marking, sawing, planning, chiseling, gauge, Vice, try square, rule, etc; Grooving, boring, joining, etc;<br>3.5  Preparation of wooden joints.<br>3.6  Safety precautions & Personal Protective Equipments.<br><br>**Course Outcome: CO1,CO2,CO3,CO4,CO5**          **Teaching Hours: 10** |
| **4** | **Welding Section: -**<br>4.1  Types, sketching, understanding the specifications, materials and applications of arc & Gas welding, Accessories and consumables.<br>4.2  Demonstration of metal joining operations like arc welding, soldering and brazing. Show effect of Current and speed. Also demonstrate various welding positions.<br>4.3  Demonstrate gas cutting operation.<br>4.4  Preparation of metal joints.<br>4.5  Safety precautions & Personal Protective Equipments.<br><br>**Course Outcome: CO1,CO2,CO3,CO4,CO5**          **Teaching Hours: 10** |
| **5** | **Fitting Section**<br>5.1  Sketching, understanding the specifications, materials, various applications and methods used in fitting, Marking, measuring, work holding, cutting & finishing tools.<br>5.2  Demonstration of various fitting operations such as chipping, filing, scraping, grinding, Sawing, marking, Drilling, tapping, etc;<br>5.3  Preparation of male, female joint.<br>5.4  Safety precautions & Personal Protective Equipments<br>**Course Outcome: CO1,CO2,CO3,CO4,CO5**          **Teaching Hours :12** |
| **6** | **Plumbing Section**<br>6.1  Types, specification, material , applications and demonstration of pipe fitting tools<br>6.2  Demonstration of pipe fitting operations such as marking, cutting, bending, threading, assembling, Dismantling  etc.<br>6.3  Types and application of various spanners such as flat, fix, ring, box, adjustable etc.<br>6.4  Preparation of pipe fitting jobs.<br>6.5  Concept and conversions of SWG and other gauges in use. Use of wire gauge.<br>6.6  Safety precautions & Personal Protective Equipments<br><br>**Course Outcome: CO1,CO2,CO3,CO4,CO5**          **Teaching Hours : 06** |

| 7 | Lathe and CNC Operations :- |
|---|---|
| | 7.1 Working principle of lathe along with sketch and procedure for its general maintenance. |
| | 7.2 Demonstration of Lathe machine operation like plain turning, taper turning, threading, Chamfering, etc. |
| | 7.3 Simple job demonstration for a group on CNC Machine. |
| | **Course Outcome:CO5**                     **Teaching Hours : 06** |

**List of experiments:**

| Sr. No. | Unit No | CO | List of Experiments | Hours |
|---|---|---|---|---|
| 1 | 1 | CO1 | Causes of accidents, general safety rules and work procedure in workshop, Safety signs and symbols, First Aid. Perform mock drill session in group of minimum 10 students for Extinguishing fire. | 06 |
| 2 | 2 | CO1,CO2,CO3,CO4,CO5 | Prepare job involving operations like bending, setting down, bulging, upsetting etc; e.g. Pegs ( Square/round), Hook, Hammer tongue, Agro equipment etc. ( Individually ) | 10 |
| 3 | 3 | CO1,CO2,CO3,CO4,CO5 | Prepare two wooden joints as per given drawings. ( Individually) | 10 |
| 4 | 4 | CO1,CO2,CO3,CO4,CO5 | Prepare lap joint/butt joint using either arc / gas welding as per given drawing.( Individually ) | 10 |
| 5 | 5 | CO1,CO2,CO3,CO4,CO5 | Prepare one Male- Female type fitting job as per given drawing. ( Individually ) | 12 |
| 6 | 6 | CO1,CO2,CO3,CO4,CO5 | Prepare two pipe joints as per given drawings. ( Individually ) | 06 |
| 7 | 7 | CO5 | Demonstration of Lathe machine & CNC machine operations. | 06 |
| | | | **Total** | **60** |

**References/ Books:**

| Sr. No. | Title | Author, Publisher, Edition and Year Of publication | ISBN |
|---|---|---|---|
| 1 | Workshop Technology - l | Hazra and Chaudhary Media promoters & Publisher private limited. | 9788185099149 |
| 2 | Workshop Technology - l | W.A.J.Chapmam Taylor &francis. | 9780713132694 |
| 3 | Workshop Practice Manual for Engineering Diploma & ITI Students | Hegde.R .K Sapna Book House, 2012, | 9798128005830 |
| 4 | Workshop familiarization. | E. Wilkinson Pitman engineering craft series. 1972 | 978 0273 3167 56 |
| 5 | Mechanical workshop practice. | K.C.John PHI. 2010 | 978 812 03416 61 |
| 6 | Workshop practice manual | K. Venkata Reddy,B. S. Publications. 6$^{th}$ ed ,2015 | 978 8178 0030 78 |

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1. http://www.asnu.com.nu b.c.
2. http://wwwabmtools.com/downioads/Woodworking%20Carpentry%20Tools.pdf d.
3. http://www.weldingtechnology.org e.http://www.newagepublishers.com
4. http://wwwyoutube.com/watch?v=TeBX6cKKHWY  g
5. http://wwwyoutube.com/watch?v=QHF0sNHnttw&feature=related h
6. http://www.youtube.com/watch?v= K v l zo9CAxt4&feature=relmfu i.
7. http://sourcing.indiamart.com/engineerig/articles/materials-used-hand-tools/

**CO Vs PO and CO Vs PSO Mapping(Mechanical )**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 2 |
| CO2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

**CO Vs PO and CO Vs PSO Mapping(Civil Engineering )**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | -- |
| CO2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | -- |
| CO3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | -- |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | -- |
| CO5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | -- |

**CO Vs PO and CO Vs PSO Mapping(Instrumentation )**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 |
| CO2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| CO3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |

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**Industry Consultation Committee:**

| Sr. No | Name | Designation | Institute/Organisation |
|---|---|---|---|
| 1 | Shri S. V. Joshi | Lecturer | G. P. Mumbai |
| 2 | Shri N. M. Ambadekar | Workshop Superintendent, | G. P. Thane |
| 3 | Shri D. B. Jadhav | Senior Manager | Auto. Division, Mahindra and Mahindra Ltd., Kandivali |

Coordinator,                                         Workshop superintendent

Curriculum Development,                   Department of  workshop

Department of  Mechanical Engineering

I/C, Curriculum Development Cell            Principal
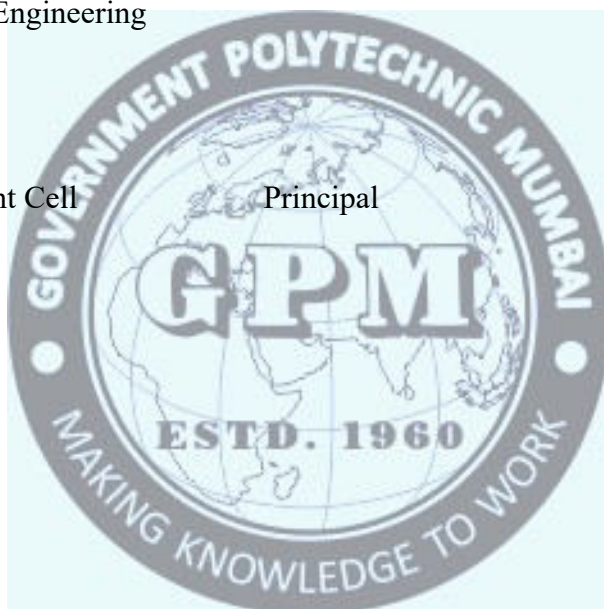
| Programme : **Diploma in Instrumentation Engineering** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code:IS19 309 | | | | Course Title: Libre Office Suite (Writer and Draw) | | | | | | |
| Compulsory / Optional: Compulsory | | | | | | | | | | |
| Teaching Scheme and Credits | | | | Examination Scheme | | | | | | |
| TH | PR | TU | Total | TH (2:30 Hrs) | TS1 (1 Hr) | TS2 (1Hr) | PR | OR | TW | Total |
| -- | 4# | -- | 4 | -- | -- | -- | -- | -- | -- | -- |

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

**Course Content Details:**

| Unit No | Topics / Sub-topics |
|---|---|
| **1** | **Libre office suite writer**<br>1. **Promo of LibreOffice Suite**<br>Outline: - LibreOffice promo - Features of LibreOffice - Uses of LibreOffice - LibreOffice formats - LibreOffice tutorials in Spoken Tutorial - Applications of LibreOffice, Libre Office tutorials in various languages<br>2. **Introduction to LibreOffice Writer**<br>Outline: Introduction to LibreOffice Writer Basic Features Toolbars How to open, close and save a document Save in MS Office, PDF and other formats Open MS Office Documents Change Bold icon Change Font Size , Change Font Name.<br>3. **Typing text and basic formatting**<br>Outline: Typing text and basic formatting Aligning Text in writer Bullet points and Numbering Cut Copy and Paste option Bold/Underline/Italics Font name/Font size/Font color in Writer, Other important and popularly used formatting features.<br>4. **Inserting pictures and objects**<br>Outline: Inserting pictures and other objects in a document Inserting pictures Inserting Tables Hyperlinks (within, across documents, from web) Creating tables AutoFormat Optimal Column Width option<br>5. **Viewing and printing a text document**<br>Outline: Viewing and printing a text document Viewing Documents Printing Documents Print Layout, Web Layout, Zoom factor , View layout. Page Preview bar Printer functions Quick Printing Print in ,reverse page order<br>6. **Using search replace auto correct**<br>Outline: Using search replace auto correct Find, Search, replace for select text Auto-correct feature Spell check Language Settings<br>7. **Typing in local languages**<br>Outline: Typing in local languages Using SCIM to type in Indian languages Bilingual typing<br>8. **Using track changes** |

| | | Outline: Using track changes as a peer review / collaborative constructivist tool, accepting and rejecting changes How to use record changes to peer review documents, accept/reject these |
|---|---|---|
| | | 9. **Headers Footers and notes** |
| | | Outline: Headers, Footers and notes, Page format – header footer, how these can change within the same document (first page without header footers), Useful footer information (page number, title), Insert Footnotes and endnotes Insert/Remove Header and Footer |
| | | 10. **Creating newsletter** |
| | | Outline: Creating newsletter Advanced use as a desktop tool to create a note with multiple columns use features like word count, Spell check, create newsletters in LibreOffice Writer and few operations that can be performed on them. |
| 2 | **Libre office suite Draw** | |
| | | 1. **Promo of LibreOffice Suite** |
| | | Outline: - LibreOffice promo - Features of LibreOffice - Uses of LibreOffice - LibreOffice formats - LibreOffice tutorials in Spoken Tutorial - Applications of LibreOffice. |
| | | 2. **Introduction** |
| | | Outline: Introduction to LibreOffice Draw LibreOffice Draw Create and save an Impress Draw file LibreOffice Draw Workspace Graphics - Bitmap or raster image - Vector graphics. |
| | | 3. **Create simple drawings** |
| | | Outline: Create simple drawings Basic shapes (lines, arrows, rectangles and squares, circles) (How to improve upon a water cycle diagram by adding shapes and so on.) Geometric shapes |
| | | 4. **Basics of working with objects** |
| | | Outline: Basics of working with objects Cut, copy, paste objects Resize objects dynamically using handles Object Arrangement Adding a new page to a file Group and ungroup objects |
| | | 5. **Fill objects with color** |
| | | Outline: Fill objects with color, gradients, hatching and bitmaps Making outlines invisible Adding a shadow to the objects Creating new colors How to import a bitmap into Draw. |
| | | 6. **Insert text in drawings** |
| | | Outline: Insert text in drawings Insert text directly inside an object Changing the text color Working with text boxes and formatting text in objects Making the line wider. |
| | | 7. **Common editing and print functions** |
| | | Outline: Common editing and print functions Set the draw page for page size and margins Paper size, page count, page numbers, date, and time Undo and redo actions Rename a page Print. |
| | | 8. **Polygons and Curves** |
| | | Outline: Curves and Polygons Various types of Polygons Draw directions using arrows Flow charts Insert tables and graphs Page Margins and Orientation Font Type and Size modification |
| | | 9. **Edit Curves and Polygons** |
| | | Outline: Use the Edit Points toolbar Insert new points Move existing points Using control lines to change the shape of the objects Group the objects together |
| | | 10. **Flow Charts Connectors Glue Points** |
| | | Outline: Draw Flowcharts To Draw Beizer curve Insert text in flow charts Various text insertion options -Resizing shape to fit text width -Word wrap text in shape What is Flowchart. |

11. **Working with Objects**
    Outline: What are Grids? What are Guides? What are Snap Lines? Position objects with grids, guides and snap lines Resize objects exactly and duplicate objects Distribute objects.

12. **Import and Export Images**
    Outline: Import images into a Draw page *as a link * as an embedded image Edit Links Remove links Automatic embedding of images Delete the picture Export the whole Draw file or one or one page of the Draw file Export to a PDF, HTML, JPEG or a bitmap file , Edit Raster images using the Format Picture tool

13. **Basics of Layers Password Encryption PDF**
    Outline: Basics-of-Layers-Password-Encryption-PDF Layers -Layout -Controls -Dimensions

14. **Working with 3D objects**
    Outline: Enable the grids and the guide lines How to create 3D objects Extrusion(Creating 3D objects, using 2D objects) 3D Toolbar 3D Rotation Object Typing text in 3D objects using Text tool, Ready-made 3D shapes.

15. **Set Draw preferences**
    Outline: Learn how to set the following preferences: **Properties **Create versions **View in color/grayscale/black-and-white Setting Title, Subject, Keywords and Comments of a file.

Coordinator,                                              Head of Department

Curriculum Development,                                   Department of  Instrumentation

Department of Instrumentation

I/C, Curriculum Development Cell                          Principal