| RGPV (DIPLOMA WING) BHOPAL | OBE CRRICULUM FOR THE COURSE | FORMAT 3 | Sheet No. 1/5 |
|---|---|---|---|

| Branch | Electronic Instrumentation | Semester | 3 |
|---|---|---|---|

| Course Code | 403 | Course Name | Instrumentation & Measurement |
|---|---|---|---|

| Course Outcome 1 | To understand the Measurement of force ,torque and Power. | Teach Hrs | Marks |
|---|---|---|---|
| Learning Outcome 1 | To Explain various methods of force measurement **( cognitive)** | 8 | 10 |
| Contents | Definition of Force , Definition of weight. Dead weight gauge Tester Pendulum Scale, Accelerometers, load Cell. probing ring, Hydraulic and Pneumatic load cells | | |
| Method of Assessment | Internal **( Mid semester Theory exam )** | | |
| Learning Outcome 2 | To classify various methods of Torque And power measurement **( cognitive)** | 8 | 10 |
| Contents | Definition of Torque, Definition of power measurement of torque of rotating shafts, Absorption type dynamometer, Mechanical & Hydraulic dynamometer, Pneumatic dynamometer Eddy current Dynamometer ,Dc Dynamometers. | | |
| Method of Assessment | External **(End Semester Theory Exam)** | | |
| Learning Outcome 3 | To measurement Force, Torque and power using different instrument **. ( Psychomotor)** | 6 | 10 |
| Contents | • To measure the lode using load cell<br>• To measure the Torque using stroboscopic Method.<br>• To measure the force, Torque and power using different method. | | |
| Method of Assessment | External **(End semester practical Exam)** | | |

| RGPV (DIPLOMAWING) BHOPAL | OBE CRRICULUM FOR THE COURSE | FORMAT 3 | Sheet No. 2/5 |
|---|---|---|---|

| Branch | Electronic Instrumentation | Semester | 4 |
|---|---|---|---|

| Course Code | 403 | Course Name | Instrumentation and Measurement |
|---|---|---|---|

| Course Outcome 2 | To understand the measurement of speed & Acceleration | Teach Hrs | Marks |
|---|---|---|---|
| Learning Outcome 4 | To Explain the construction and working of Tachometer For Velocity measurement. **( cognitive)** | **8** | **10** |
| **Contents** | Definition of velocity ,mechanical Tachometer ,Electrical Tachometer, Electromagnetic Tachometer generator | | |
| **Method of Assessment** | External **(End Semester Theory Exam)** | | |
| **Learning Outcome 5** | To understand various Digital methods for Velocity measurement**( cognitive)** | **8** | **10** |
| **Contents** | Photoelectric Tachometer, Toothed rotor variable reluctance tachometer, Stroboscopic methods | | |
| **Method of Assessment** | Internal **(Assignment)** | | |
| **Learning Outcome 6** | To classify various methods of Vibrations and Shock measurement**( cognitive)** | **6** | **10** |
| **Contents** | Accelerometers, Seismic Transducers , Potentiometric Type Accelerometer, ,LVDT Accelerometer, Strain Gauge Accelerometer, piezo –electric Accelerometer. | | |
| **Method of Assessment** | External**(End Semester Theory Exam)** | | |

| RGPV (DIPLOMA WING) BHOPAL | OBE CRRICULUM FOR THE COURSE | FORMAT 3 | Sheet No. 3/5 |
|---|---|---|---|

| Branch | Electronic Instrumentation | Semester | 3 |
|---|---|---|---|

| Course Code | 403 | Course Name | Instrumentation and Measurement |
|---|---|---|---|

| Course Outcome 3 | Explain the various methods of pressure measurement | Teach Hrs | Marks |
|---|---|---|---|
| Learning Outcome 7 | To Define the various Term for pressure. (**cognitive)** | 8 | 10 |
| Contents | To introduction of Pressure ,Static Pressure, velocity Pressure, Absolute pressure Gauge pressure, Gauge Pressure, Vacuum Pressure, Unit of pressure, Relation between different unit of pressure. | | |
| Method of Assessment | Internal **(mid semester theory Exam)** | | |
| Learning Outcome 8 | Explain Measurement of Pressure using Elastic sensing Elements & Manometers (**cognitive)** | 6 | 10 |
| Contents | Elastic sensing Elements:-Bourdon Tube ,Bellows ,Diaphragm ,Capsules Monometers:- Manometric Fluid, U-Tube Manometer, Well Type Manometer, inclined Tube Manometer, micro Manometer | | |
| Method of Assessment | External**(End Semester Theory Exam)** | | |
| Learning Outcome 9 | Explain Various Instrument For Vacuum Pressure measurement. **( cognitive)** | 6 | 10 |
| Contents | Barometer, Mc-leod Gauge ,Thermal conductivity Gauge -Thermocouple Gauge ,Pirani Gauge, ionization Gauge | | |
| Method of Assessment | External **(End Semester Theory Exam)** | | |



| Branch | Electronic Instrumentation | Semester | 4 |
|---|---|---|---|

| Course Code | 403 | Course Name | Instrumentation and Measurement |
|---|---|---|---|

| Course Outcome 4 | Explain the various methods Fluid Flow measurements | Teach Hrs | Marks |
|---|---|---|---|
| **Learning Outcome 10** | Explain variable Head And variable Area Type Flow meter.**( cognitive)** | **10** | **10** |
| **Contents** | Introduction Flow ,laminar and turbulent flow , Venturimeter ,Orifice Plate, Flow Nozzles, Dall tube Pitot Tube, Weirs And Flumes , Rotameter | | |
| **Method of Assessment** | Internal**(Assingment)** | | |
| **Learning Outcome 11** | Explain Various Type Flow meter.**( cognitive)** | **8** | **10** |
| **Contents** | Electromagnetic Flow meter, Turbine Flow meter, Vortex meter, ultrasonic Flow meter , Laser Doppler Anemometer(LDA) | | |
| **Method of Assessment** | External **(End Semester Theory Exam)** | | |
| **Learning Outcome 12** | To Understand And measure fluid flow using Various device **( Psychomotor)** | **6** | **10** |
| **Contents** | Measure the flow use Venturimeter ,Measure the flow use Orifice Plat , Measure the flow use Rota meter, Measure the Flow use Electromagnetic flow meter (Lab) | | |
| **Method of Assessment** | External**(End Semester Practical Exam)** | | |

| RGPV (DIPLOMA WING) BHOPAL | OBE CRRICULUM FOR THE COURSE | FORMAT 3 | Sheet No. 5/5 |
|---|---|---|---|

| Branch | Electronics and Instrumentation | Semester | 4 |
|---|---|---|---|

| Course Code | 403 | Course Name | Instrumentation and Measurement |
|---|---|---|---|

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|---|---|---|---|
| **Course Outcome 5** | Explain the various methods of temperature measurements | **Teach Hrs** | **Marks** |
| **Learning Outcome 13** | To Understand the Some definitions and Heat transfer methods**.( Cognitive)** | **8** | **10** |
| **Contents** | Temperature, Different types of method Used in Heat Transfer, Conduction, convection and radiation , Various units of Temperature conversion , Thermal conductivity ,Temperature range of various temperature measuring element, Liquid in glass Thermometers, Liquid in metal Thermometer ,Bi-metallic Thermometer | | |
| **Method of Assessment** | External **(End Semester theory Exam)** | | |
| **Learning Outcome 14** | To understand Electrical methods of Measurement of Temperature.**(Psychomotor )** | **8** | **10** |
| **Contents** | RTD, Materials used For RTDs, Constructional Details of RTDs, Measurement of Resistance of Thermometers Three And four lead Arrangement ,Salient Features Of RTDs<br>Thermocouples, Materials used For Thermocouples, Constructional Details of Thermocouples, Installation of Thermocouples<br>Thermistor, Materials used For Thermistor, Constructional Details of Thermistor | | |
| **Method of Assessment** | External**(End Semester Practical Exam)** | | |
| **Learning Outcome 15** | To understands various methods of High Temperature measurement by using Pyrometer | **6** | **10** |
| **Contents** | Explain the Radiation Pyrometer, Principal used for Radiation Temperature measuring Device<br>Explain the Optical Pyrometer ,Disappearing Filament Optical Pyrometer | | |
| **Method of Assessment** | Internal (Assignment) | | |

**Suggested List of Experiments:**

| S.N. | Experiment | CO |
|---|---|---|
| 1 | To measure the weight using load cell | CO 403-1 |
| 2 | To Measure the Speed of Shaft by using Stroboscope Tachometer. | CO 403-1 |
| 3 | To Explain the Dead weight gauge Tester. | CO 404-1 |
| 4 | To Measure the flow using rota meter | CO403-4 |

| | | |
|---|---|---|
| 5 | To Measure the flow using Venturimeter | CO 403-4 |
| 6 | To Measure the flow using electromagnetic flow meter | CO403-4 |
| 7 | To Measure the flow using pitot tube | CO403-4 |
| 8 | To Measure The Temperature by using RTD | CO405-5 |
| 9 | To Measure The Temperature by using Thermisters. | CO405-5 |
| 10 | To Measure The Temperature by using Thermocouple | CO405-5 |

**Major Equipment/Materials:**

| | |
|---|---|
| 1 | Tachometers. |
| 2 | Dual Power Supply |
| 3 | Thermocouples. |
| 4 | Thermisters. |
| 5 | Breadboard, discrete components, wires |
| 6 | Multimeter/Ammeter/Voltmeter |
| 7 | LCR Meter |
| 8 | Standard ICs |

**Suggestions for Practical's:**

Experiments are expected to be performed

1. Using breadboard/trainer kits.
2. on simulation software (vizPSpice, TINA, Multisim, KiCAD, LTSpice, LabView, Simulink, Proteus, CircuitMaker etc.)
3. On virtual lab platforms available online (like: vlab.co.in, falstad.com/circuit etc.) **Reference**

**Books/Web Portals:**

| S.N. | Title& Publication | Author |
|---|---|---|

| | | |
|---|---|---|
| **1** | Mechanical Measurement. | A. K. Sawhney<br>PuneetSawhney |
| **2** | Modern Electronic Instruments and Measurement Techniques, PHI, ISBN: 9788120307520 | Helfrick A. D. and Cooper W. D. |
| **3** | Electrical and Electronics Measurements and Instrumentation., DhanpaiRai and Co., New Delhi,: 9780000279744 | Sawhney A.K. |
| **4** | Electrical Measurements, Technical Publication Pune. | Bakshi U. A., Bakshi A. V. and Bakshi K. A. |
| **5** | Electrical and Electronic Measurement and Instrumentation, S. Chand and Co.<br>New Delhi, ISBN : 9789385676017 | Rajput R.K. |
| **6** | Electrical Measurements and Measuring Instruments, S. K. Kataria and sons, Delhi, ISBN: 9788188458264 | Gupta J. B. |
| **7** | nptel.ac.in | |
| **8** | swayam.gov.in | |