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| --- | --- | --- | --- | --- | --- | --- |
| 1 | | Course No. | | | EIE-302 | |
| 2 | | Course Title | | | Industrial Instrumentation | |
| 3 | | Credits | | | 3 | |
| 4 | | Contact Hours (L-T-P) | | | 3-1-0 | |
| 5 | | Course Objective | | | * To explain the principles of sensors and transducers. * To explain the maesurement of various physical quantities like temperature , pressure, flow, humidity. * To acquire knowledge on mesaurement techniques * To acquire knowledge on design of mesaurement techniques | |
| 6 | | Course Outcomes | | | After completing this course students will be able   1. Able to classify different types of sensor & transducer, 2. Understanding of principle and working of sensor or transducer 3. Identifying correct sensor or transducer for a particular application 4. Designing of basic sensor or transducer circuit | |
| 7 | | Outline syllabus: | | | | |
| **7.1** | | **EIE-302A** | | **Unit A** | | **Temperature Measurement** |
| 7.1.1 | | EIE-302A1 | | Unit A 1 | | Concept of sensor & transducer. Classification of them |
| 7.1.2 | | EIE-302A2 | | Unit A 2 | | Classification of temperature sensors and transducers |
| 7.1.3 | | EIE-302A3 | | Unit A 3 | | Bimetallic Thermometers, Thermocouples, RTD, thermistors |
| **7.2** | | **EIE-302B** | | **Unit B** | | **Pressure Measurement** |
| 7.2.1 | | EIE-302B1 | | Unit B 1 | | Classification of Pressure sensors and transducers |
| 7.2.2 | | EIE-302B2 | | Unit B 2 | | Low, Medium & High Pressure measurement |
| 7.2.3 | | EIE-302B3 | | Unit B 3 | | Pressure switches and dead weight pressure gauge |
| **7.3** | | **EIE-302C** | | **Unit C** | | **Flow Measurement** |
| 7.3.1 | | EIE-302C1 | | Unit C 1 | | Classification of flow sensors and transducers |
| 7.3.2 | | EIE-302C2 | | Unit C 2 | | Orifice, Venturi, pitot tube and rotameter for flow measurements |
| 7.3.3 | | EIE-302C3 | | Unit C 3 | | Turbine type, electromagnetic type and ultrasonic type flow meters |
| **7.4** | | **EIE-302D** | | **Unit D** | | **Level, Motion** |
| 7.4.1 | | EIE-302D1 | | Unit D 1 | | Magnetic type, capacitance type and conductive type level measurements |
| 7.4.2 | | EIE-302D2 | | Unit D 2 | | Ultrasonic, radar, guided wave radar and nuclear level measurement |
| 7.4.3 | | EIE-302D3 | | Unit D 3 | | Diff Pressure based level measurement & Level switches |
| **7.5** | | **EIE-302E** | | **Unit E** | | **Other measurements** |
| 7.5.1 | | EIE-302E1 | | Unit E 1 | | LVDT, digital linear and rotary displacement measurement |
| 7.5.2 | | EIE-302E2 | | Unit E 2 | | Coriolis, Vortex shedding flow meters |
| 7.5.3 | | EIE-302E3 | | Unit E 3 | | Pyrometers (Radiation & optical) |
| 8 | Course Evaluation | | | | | |
| 8.1 | Course work: 30% | | | | | |
| 8.11 | Attendance | | 5 % | | | |
| 8.12 | Assignment | | 5% | | | |
| 8.13 | Quizzes | | 10% | | | |
| 8.14 | Presentations | | 5% | | | |
| 8.15 | Project | | 5% | | | |
| 8.21 | MSE | | 20% | | | |
| 8.3 | End-Semester examination: 50% | | | | | |
| 9 | References- 1. Basic Process Measurements. Cecil L. Smith, CRC press | | | | | |
| 9.1 | Text book | | 1. Measurement Systems. Application and Design. Fifth Edition. Ernest O. Doebelin, TMH | | | |
| 9.2 | Other references | | 1. Instrumentation Engineers Handbook by IJB Liptak, CRC press 2. Principles of Industrial Instrumentation Second Edition D Patranabis, TMH | | | |

**Mapping of Outcomes vs. Topics**

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| --- | --- | --- | --- | --- |
| Outcome no. →  Syllabus topic↓ | 1 | 2 | 3 | 4 |
| EIE-302A |  |  |  |  |
| EIE-302A1 | X |  |  |  |
| EIE-302A2 |  | X |  | X |
| EIE-302A3 |  |  | X | X |
| EIE-302B |  |  |  |  |
| EIE-302B1 | X |  |  |  |
| EIE-302B2 |  | X |  | X |
| EIE-302B3 |  |  | X | X |
| EIE-302C |  |  |  |  |
| EIE-302C1 | X |  |  |  |
| EIE-302C2 |  | X |  | X |
| EIE-302C3 |  |  | X | X |
| EIE-302D |  |  |  |  |
| EIE-302D1 | X |  |  |  |
| EIE-302D2 |  | X |  | X |
| EIE-302D3 |  |  | X | X |
| EIE-302E |  |  |  |  |
| EIE-302E1 | X |  |  |  |
| EIE-302E2 |  | X |  | X |
| EIE-302E3 |  |  | X | X |