**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

*Department of Mechanical Engineering*

**LESSON PLAN**

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| --- | --- |
| **Academic Year** : 2016-17 | **Sem**  : I |
| **Course**: Instrumentation & Control Systems | |
| **Class** : III B.TECH | **Section** : ME A&B |
| **Date of commencement of Class work** :13/06/2016 | **Date of end of Class work** : 08/10/2016 |
| **Prepared By** M.Kiran Durga Kumar, Assistant Professor | **Approved By**: HOD |

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| **Lecture**  **No** | **Date (As per Academic calendar)** | **Topics to be covered** | **Actual**  **Date of completion** | **Remarks** |
| 1 | **13.6.16** | **Instrumentation and control systems**: Introduction |  |  |
| 2 | **14.6.16** | **Measurement:** Definition |  |  |
| 3 | **15.6.16** | **Measurement:** Types of measurement |  |  |
| 4 | **16.6.16** | **Measurement:**Methods of measurement |  |  |
| 5 | **17.6.16** | **Measurement:**Basic principles of measurement |  |  |
| 6 | **18.6.16** | **Measurement:**Basic principles of measurement |  |  |
| 7 | **20.6.16** | **Measurement:**Basic principles of measurement |  |  |
| 8 | **21.6.16** | **Instrumentation** -Definition |  |  |
| 9 | **22.6.16** | **Measurement:** Generalized configuration |  |  |
| 10 | **23.6.16** | **Measurement:** Generalized configuration |  |  |
| 11 | **24.6.16** | **Measurement:**Functional descriptions of measuring instruments – examples |  |  |
| 12 | **25.6.16** | **Measurement:**Functional descriptions of measuring instruments – examples |  |  |
| 13 | **27.6.16** | **Dynamic performance characteristics** – reproducibility & repeatability |  |  |
| 14 | **28.6.16** | **Error:** Sources of error |  |  |
| 15 | **29.6.16** | **Error:** classification and elimination of error |  |  |
| 16 | **30.6.16** | **MEASUREMENT OF DISPLACEMENT:** Theory and construction of various transducers to measure displacement |  |  |
| 17 | **01.7.16** | Piezo electric & capacitance transducers |  |  |
| 18 | **02.7.16** | inductive transducers |  |  |
| 19 | **04.07.16** | resistance transducers |  |  |
| 20 | **05.7.16** | ionization and photo electric transducers |  |  |
| 21 | **07.7.16** | **UNIT-II MEASUREMENT OF TEMPERATURE:** Classification – ranges |  |  |
| 22 | **08.7.16** | various principles of measurement- expansion |  |  |
| 23 | **09.7.16** | various principles of measurement- electrical resistance |  |  |
| 24 | **11.7.16** | thermistor |  |  |
| 25 | **12.7.16** | thermocouple |  |  |
| 26 | **13.7.16** | pyrometers- Temperature indicators |  |  |
| 27 | **14.7.16** | **MEASUREMENT OF PRESSURE:**  units- Classification- different principles used |  |  |
| 28 | **15.7.16** | Manometers |  |  |
| 29 | **16.7.16** | piston, bourdon pressure gauges |  |  |
| 30 | **18.7.16** | bellows-diaphragm gauges. |  |  |
| 31 | **19.7.16** | low pressure measurement- thermal conductivity gauges- ionization pressure gauges, mcleod gauge |  |  |
| 32 | **20.7.16** | **UNIT-III MEASUREMENT OF LEVEL:** Direct method – indirect methods- Capacitative indicators |  |  |
| 33 | **21.7.16** | ultrasonic indicators, magnetic indicators |  |  |
| 34 | **22.7.16** | cryogenic fuel level indicators- bubler level indicator |  |  |
| 35 | **23.7.16** | **Flow Measurement:** Rotameter, turbine flow meter |  |  |
| 36 | **25.7.16** | magnetic, Ultrasonic |  |  |
| 37 | **26.7.16** | hot-wire anemometer |  |  |
| 38 | **27.7.16** | laser Doppler anemometer(LDA) |  |  |
| 39 | **28.7.16** | **MEASUREMENT OF SPEED:** Mechanical tachometers- electrical tachometers |  |  |
| 40 | **29.7.16** | stroboscope, noncontact type of tachometer |  |  |
| 41 | **30.7.16** | **MEASUREMENT OF ACCELERATION AND VIBRATION:** Different simple instruments- |  |  |
| 42 | **01.8.16** | principles of seismic instruments vibrometer and accelerometer using this principle |  |  |
| 43 | **02.8.16** | accelerometer |  |  |
| 44 | **03.8.16** | Revision |  |  |
| 45 | **04.08.16** | Revision |  |  |
| 46 | **05.08.16** | Revision |  |  |
| 47 | **06.8.16** | Revision |  |  |
|  | **08.8.16 To13.8.16** | MID EXAMINATIONS-I |  |  |
| 48 | **16.8.16** | **UNIT-IV** STRESS STRAIN MEASUREMENTS: **various types** of stress and strain |  |  |
| 49 | **17.8.16** | electrical strain gauge- gauge factor |  |  |
| 50 | **18.8.16** | method of usage of resistance strain gauge for bending &compressive |  |  |
| 51 | **19.8.16** | method of usage of resistance strain gauge for bending &compressive |  |  |
| 52 | **20.8.16** | method of usage of resistance strain gauge for tensile strains |  |  |
| 53 | **22.8.16** | usage for measuring torque |  |  |
| 54 | **23.08.16** | usage for measuring torque |  |  |
| 55 | **24.08.16** | usage for measuring strain gauge rosette |  |  |
| 57 | **26.8.16** | usage for measuring strain gauge rosette |  |  |
| 58 | **27.8.16** | PROBLEMS |  |  |
| 59 | **29.8.16** | Revision |  |  |
| 60 | **30.08.16** | **Uint-V MEASUREMENT OF HUMIDITY:** Moisture content of gases |  |  |
| 61 | **31.08.16** | sling psychrometer |  |  |
| 62 | **1.9.16** | absorption psychrometer |  |  |
| 63 | **2.9.16** | dew point meter |  |  |
| 64 | **3.9.16** | **MEASUREMENT OF FORCE, TORQUE AND POWER:** Elastic Force Meters, |  |  |
| 65 | **06.09.16** | Elastic Force Meters |  |  |
| 66 | **07.9.16** | Elastic Force Meters |  |  |
| 67 | **8.9.16** | Load cells |  |  |
| 68 | **09.9.16** | torsion meters |  |  |
| 69 | **10.9.16** | dynamometers |  |  |
| 70 | **13.9.16** | dynamometers |  |  |
| 71 | **14.9.16** | dynamometers |  |  |
| 72 | **15.9.16** | Revision |  |  |
| 73 | **16.9.16** | **UNIT-VI ELEMENTS OF CONTROL SYSTEMS:**  **Introduction** |  |  |
| 74 | **17.9.16** | **CONTROL SYSTEMS**: importance |  |  |
| 75 | **19.9.16** | **CONTROL SYSTEMS**: Classification |  |  |
| 76 | **20.9.16** | **CONTROL SYSTEMS**: open and closed sytems |  |  |
| 77 | **21.9.16** | **CONTROL SYSTEMS**: Servo mechanisms |  |  |
| 78 | **22.9.16** | examples with block diagrams- temperature |  |  |
| 79 | **23.9.16** | examples with block diagrams- temperature |  |  |
| 80 | **24.9.16** | examples with block diagrams- temperature |  |  |
| 81 | **26.9.16** | examples with block diagrams- temperature |  |  |
| 82 | **27.9.16** | examples with block diagrams- temperature |  |  |
| 83 | **28.9.16** | examples with block diagrams- speed |  |  |
| 84 | **01.10.16** | examples with block diagrams- speed |  |  |
| 85 | **03.10.16** | examples with block diagrams- position control systems |  |  |
| 86 | **04.10.16** | examples with block diagrams- position control systems |  |  |
| 87 | **05.10.16** | Revision |  |  |
| 88 | **06.10.16** | Revision |  |  |
| 89 | **07.10.16** | Revision |  |  |
| 90 | **08.10.16** | Revision |  |  |
|  | **10.10.16 To 15.10.16** | Mid Exams-II |  |  |

**TEXT BOOKS:**

1. Measurement Systems: Applications & design by D.S Kumar.

2. Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI /

PE.

**REFERENCES:**

1. Measurement systems: Application and design, Doeblin Earnest. O.

Adaptation by Manik and Dhanesh/ TMH.

2. Experimental Methods for Engineers / Holman.

3. Mechanical and Industrial Measurements / R.K. Jain/ Khanna

Publishers.

4. Instrumentation, measurement & analysis by B.C.Nakra &

K.K.Choudhary, TMH.

**Course outcomes:**

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| Sub code | Sub Name | COs | Expected level of attainment  On 5 scale |
|  | Instrumentation & Control Systems | 1. Understanding the concepts of measurement systems  2. To select appropriate device for measurment.  3. Also to measure parameters like temperature pressure, speed, stress, humidity ,flow velocity etc.  .  4. To understand the basic principles characteristics and performance of various devices. | 3.5  3.5  3.5  3.5 |

**Course Coordinator Head of the Department**