**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 attainmentOn 5 scale |
|  | Instrumentation & Control Systems | 1. Understanding the concepts of measurement systems2. 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. | 3.53.53.53.5 |

**Course Coordinator Head of the Department**