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| SHANTILAL SHAH ENGINEERING COLLEGE | | | |
| Department of Production Engineering  **LECTURE PLAN & LAB/TUTORIAL PLAN** | | | |
| Course Code : | 2142503 | Year/Semester : | BE II Year/ 4th Semester |
| Course Name : | METROLOGY AND MEASUREMENT | Academic Year : | 2017-18/ EVEN |
| L –T- P : | 3-2 | Credit : | 5 |
| Course Detail : | Theory and Practical | Term Start Date : | 26/12/2017 |
| Course Coordinator : | Prof. N P Nirmal | Term End Date : | 24/04/2018 |
| Team of Instructors : |  | Class Test 1 : | - |
| Faculty Name: | Prof. N P Nirmal (Th.+ Lab) | Class Test 2 : | - |
| Prof. J A Bhoi (Th.) | Mid Term Exam : | Tentative 5/03/18 to 13/03/18 |
| Prof. P H Solanki (Lab) |

| **SHANTILAL SHAH ENGINEERING COLLEGE, BHAVNAGAR**  **Department of Mechanical Engineering** | | | | | | |
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| **Lesson Plan** | | | | | | |
| **Academic Year : 2017-18** | | | **Sem. : 4th Semester Division A** | | | |
| **Name of Teacher : Prof. N P Nirmal, Prof. J A Bhoi** | | | **Name of Department : Production Engineering** | | | |
| **Subject : Measurement and Metrology** | | | **Hrs./Week : 3 Hrs/ Week** | | | |
| **Theory/Tutorial : Theory** | | | **Days :** | | | |
| **Sr. No.** | **Name of Unit/Topics** | **Hrs. Allotted** | **Planned Date** | **Actual Date** | **Teaching Aid Code** | **Remarks** |
| **1** | **Unit 1: Mechanical measurement** | **3** |  |  |  |  |
| A | Need of mechanical measurement, Basic definitions: Hysteresis, Linearity, Resolution of measuring instruments, | 1 | 28.12.17 |  | 1 | Prof. JAB |
| B | Threshold, Drift, Zero stability, loading effect and system response | 1 | 04.01.18 |  | 1 | Prof. JAB |
| C | Measurement methods, Generalized Measurement system, Static performance characteristics, Errors and their classification. | 1 | 11.01.18 |  | 1 | Prof. JAB |
| **2** | **Unit 2: Measurement of force, torque and strain** | **6** |  |  |  |  |
| A | Force measurement: load cells, cantilever beams, Proving rings, differential transformers | 1 | 18.01.18 |  | 1 | Prof. JAB |
| B | Measurement of torque: Torsion bar dynamometer, servo controlled. | 1 | 01.02.18 |  | 1 | Prof. JAB |
| C | Dynamometer, absorption dynamometers. Power Measurements | 1 | 08.02.18 |  | 1 | Prof. JAB |
| D | Measurement of strain: Mechanical strain gauges, electrical strain gauges | 1 | 15.02.18 |  | 1 | Prof. JAB |
| E | Strain gauge materials, gauge factors | 1 | 22.02.18 |  | 1 | Prof. JAB |
| F | Theory of strain gauges and method of measurement, bridge arrangement, temperature compensation. | 1 | 08.03.18 |  | 1 | Prof. JAB |
| **3** | **Unit 3 : Displacement, velocity/speed and acceleration measurement** | **4** |  |  |  |  |
| A | Working principal of Resistive Potentiometer, Linear variable differential transducers | 1 | 26.12.17 |  | 1 | Prof.NPN |
| B | Electro Magnetic Transducers: Mechanical | 1 | 01.01.18 |  | 1 | Prof.NPN |
| C | Transducers Electrical, Photoelectric Tachometers | 1 | 02.01.18 |  | 1 | Prof.NPN |
| D | Piezoelectric Accelerometer, Seismic Accelerometer | 1 | 08.01.18 |  | 1 | Prof.NPN |
| **4** | **Unit 4: Temperature measurement** | **4** |  |  |  |  |
| A | Temperature Measuring Devices: Thermocouples, Resistance Temperature Detectors, | 1 | 09.01.18 |  | 1 | Prof.NPN |
| B | Thermistor, Liquid in glass Thermometers, Pressure Thermometers, | 1 | 15.01.18 |  | 1 | Prof.NPN |
| C | Pyrometer, Bimetallic strip | 1 | 16.01.18 |  | 1 | Prof.NPN |
| D | Calibration of temperature measuring devices, Numerical Examples on Flow Measurement.1 | 1 | 22.01.18 |  | 1 | Prof.NPN |
| **5** | **Unit 5: Metrology** | **2** |  |  |  |  |
| A | Basics of Metrology, Need for Inspection, Accuracy and Precision, | 1 | 15.03.18 |  | 1 | Prof. JAB |
| B | Objectives, Standards of measurements. | 1 | 22.03.18 |  | 1 | Prof. JAB |
| **6** | **Unit 6: Linear and angular measurements:** | **7** |  |  |  |  |
| A | Working principle , constriction , Measurement prouder, error and elimination, limitations and calibration of Vernier Calliper | 1 | 23.01.18 |  | 1, 3 | Prof.NPN |
| B | " of Micrometer | 1 | 29.01.18 |  | 1, 3 | Prof.NPN |
| C | Miscellaneous linear measuring instruments | 1 | 30.01.18 |  | 1, 3 | Prof.NPN |
| D | Dial gauge indicator | 1 | 05.02.18 |  | 1, 3 | Prof.NPN |
| E | Working principle , constriction , Measurement prouder, error and elimination, limitations and calibration angular measuring instrument Sine Bar | 1 | 06.02.18 |  | 1, 3 | Prof.NPN |
| F | Bevel Protector | 1 | 12.02.18 |  | 1, 3 | Prof.NPN |
| G | Miscellaneous angular measuring instruments | 1 | 19.02.18 |  | 1, 3 | Prof.NPN |
| **7** | **Unit 7: Metrology of Gears and screw threads** | **6** |  |  |  |  |
| A | Gear tooth terminology, Sources of errors in manufacturing of gears, Measurement of tooth thickness: Gear tooth vernier | 1 | 20.02.18 |  | 1, 3 | Prof.NPN |
| B | Constant chord method, Addendum comparator method and Base tangent method | 1 | 26.02.18 |  | 1, 3 | Prof.NPN |
| C | Measurement of tooth profile: Tool maker’s microscope or projector, Involute tester | 1 | 27.02.18 |  | 1, 3 | Prof.NPN |
| D | Measurement of concentricity, Alignment of gears. | 1 | 05.03.18 |  | 1, 3 | Prof.NPN |
| E | Screw Thread Measurement: Errors in threads, screw thread gauges, measurement of element of the external, | 1 | 06.03.18 |  | 1, 3 | Prof.NPN |
| F | Measurement of element of the internal threads, thread caliper gauges Alignment testing | 1 | 12.03.18 |  | 1, 3 | Prof.NPN |
| **8** | **Unit 8: Metrology of Surface finish** | **6** |  |  |  |  |
| A | Surface Metrology Concepts and terminology, Analysis of surface traces, , | 1 | 19.03.18 |  | 1 | Prof.NPN |
| B | Specification of surface Texture characteristics | 1 | 20.03.18 |  | 1 | Prof.NPN |
| C | Method of measuring surface finish: Stylus system of measurement | 1 | 26.03.18 |  | 1 | Prof.NPN |
| D | Specification of surface Texture characteristics, and Method of measuring surface finish: | 1 | 27.03.18 |  | 1 | Prof.NPN |
| E | Stylus system of measurement other methods for measuring surface roughness: | 1 | 21.04.18 |  | 1 | Prof.NPN |
| F | Pneumatic method, Light Interference microscopes, Mecrin Instruments. | 1 | 03.04.18 |  | 1 | Prof.NPN |
| **9** | **Unit 9: Comparators** | **3** |  |  |  |  |
| A | Functional Requirements, Classification, Mechanical Comparators | 1 | 05.04.18 |  | 1 | Prof. JAB |
| B | Mechanical Optical Comparators | 1 | 12.04.18 |  | 1 | Prof. JAB |
| C | Electrical Comparators, Pneumatic Comparators | 1 | 19.04.18 |  | 1 | Prof. JAB |
| **10** | **Unit 10: Miscellaneous Metrology** | **6** |  |  |  |  |
| A | Precision instrumentation based on laser principles, coordinate measuring machines | 1 | 09.04.18 |  | 1 | Prof.NPN |
| B | Structure, modes of operation, probe operation and applications | 1 | 10.04.18 |  | 1 | Prof.NPN |
| C | Optical measuring techniques, tool makers microscope, profile projector | 1 | 16.04.18 |  | 1 | Prof.NPN |
| D | Optical square, basic of optical interference and interferometry, optoelectronic measurements | 1 | 17.04.18 |  | 1 | Prof.NPN |
| E | Pressure measurement, bourdon tube, diaphragm, bellow pressure gauge | 1 | 23.04.18 |  | 1 | Prof.NPN |
| F | Dead weight tester, ionization gauges | 1 | 24.04.18 |  | 1 | Prof.NPN |
| **Teaching Aid Code:** | |  |  |  |  |  |
| 1 | O.H.P √ |  |  |  |  |  |
| 2 | L.C.D PROJECTER | Sign of Teacher : Prof. N P Nirmal Prof. J A Bhoi | | | | |
| 3 | MODEL √ |  |  |  |  |  |
| 4 | CHART |  |  |  |  |  |
| 5 | OTHER (VIDEO) √ |  |  | Sign of H.O.D : \_\_\_\_\_\_\_\_\_\_\_ | | |
| ***\* Remark column should cover any slippages and remedial action planned*** | | | | | | |
| LESSON PLANNING, Rev. no. :00 | | | Page no.:4 of 9 | | | |

**Reference Books:**

1. Engineering Metrology and Measurement, N V Raghavendra and Krishnamurthy, Oxford University Press,

2. Engineering Metrology and Measurements, Bentley, Pearson Education

3. Theory and Design for Mechanical Measurements, 3rd Edition, Richard S Figliola, Donald E Beasley, Wiley India

4. Metrology and Measurement, Anand Bewoor & Vinay Kulkarni McGraw-Hill

5. Doebelin's Measurement Systems Ernest Doebelin, Dhanesh Manik McGraw-Hill

6. Instrumentation, Measurement and Analysis, B.C. Nakra, K.K. Chaudhry McGraw-Hill

7. A Text book of Engineering Metrology, I C Gupta, Dhanpat Rai Publications

8. A course in Mechanical Measurements and Instrumentation, A K Sawhney, Dhanpat Rai Publications

9. Mechanical Measurements and Instrumentations, Er. R K Rajput, Kataria Publication(KATSON)

10. Mechanical Measurement and Metrology by R K Jain, Khanna PublisherMechanical Measurement & Control by D.S. Kumar.

11. Industrial Instrumentation & Control by S K Singh, McGrawHill

12. Mechanical Measurements by Beckwith & Buck, Narosa publishing House

13. A textbook of Metrology by M. Mahajan, Dhanpat rai & Co.

14. Mechanical measurement and metrology by J.P. Hadiy, H.G. Katariya, Books India Publicationis.

| **SHANTILAL SHAH ENGINEERING COLLEGE, BHAVNAGAR**  **Department of Mechanical Engineering** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Lesson Plan** | | | | | | |
| **Academic Year : 2017-18** | | | **Sem. : 4th Semester Division B** | | | |
| **Name of Teacher : Prof. N P Nirmal, Prof. J A Bhoi** | | | **Name of Department : Production Engineering** | | | |
| **Subject : Measurement and Metrology** | | | **Hrs./Week : 3 Hrs/ Week** | | | |
| **Theory/Tutorial : Theory** | | | **Days :** | | | |
| **Sr. No.** | **Name of Unit/Topics** | **Hrs. Allotted** | **Planned Date** | **Actual Date** | **Teaching Aid Code** | **Remarks** |
| **1** | **Unit 1: Mechanical measurement** | **3** |  |  |  |  |
| A | Need of mechanical measurement, Basic definitions: Hysteresis, Linearity, Resolution of measuring instruments, | 1 | 29.12.17 |  | 1 | Prof. JAB |
| B | Threshold, Drift, Zero stability, loading effect and system response | 1 | 05.01.18 |  | 1 | Prof. JAB |
| C | Measurement methods, Generalized Measurement system, Static performance characteristics, Errors and their classification. | 1 | 12.01.18 |  | 1 | Prof. JAB |
| **2** | **Unit 2: Measurement of force, torque and strain** | **6** |  |  |  |  |
| A | Force measurement: load cells, cantilever beams, Proving rings, differential transformers | 1 | 19.01.18 |  | 1 | Prof. JAB |
| B | Measurement of torque: Torsion bar dynamometer, servo controlled. | 1 | 02.02.18 |  | 1 | Prof. JAB |
| C | Dynamometer, absorption dynamometers. Power Measurements | 1 | 09.02.18 |  | 1 | Prof. JAB |
| D | Measurement of strain: Mechanical strain gauges, electrical strain gauges | 1 | 16.02.18 |  | 1 | Prof. JAB |
| E | Strain gauge materials, gauge factors | 1 | 23.02.18 |  | 1 | Prof. JAB |
| F | Theory of strain gauges and method of measurement, bridge arrangement, temperature compensation. | 1 | 02.03.18 |  | 1 | Prof. JAB |
| **3** | **Unit 3 : Displacement, velocity/speed and acceleration measurement** | **4** |  |  |  |  |
| A | Working principal of Resistive Potentiometer, Linear variable differential transducers | 1 | 27.12.17 |  | 1 | Prof.NPN |
| B | Electro Magnetic Transducers: Mechanical | 1 | 28.12.17 |  | 1 | Prof.NPN |
| C | Transducers Electrical, Photoelectric Tachometers | 1 | 03.01.18 |  | 1 | Prof.NPN |
| D | Piezoelectric Accelerometer, Seismic Accelerometer | 1 | 04.01.18 |  | 1 | Prof.NPN |
| **4** | **Unit 4: Temperature measurement** | **4** |  |  |  |  |
| A | Temperature Measuring Devices: Thermocouples, Resistance Temperature Detectors, | 1 | 10.01.18 |  | 1 | Prof.NPN |
| B | Thermistor, Liquid in glass Thermometers, Pressure Thermometers, | 1 | 11.01.18 |  | 1 | Prof.NPN |
| C | Pyrometer, Bimetallic strip | 1 | 17.01.18 |  | 1 | Prof.NPN |
| D | Calibration of temperature measuring devices, Numerical Examples on Flow Measurement. | 1 | 18.01.18 |  | 1 | Prof.NPN |
| **5** | **Unit 5: Metrology** | **2** |  |  |  |  |
| A | Basics of Metrology, Need for Inspection, Accuracy and Precision, | 1 | 09.03.18 |  | 1 | Prof. JAB |
| B | Objectives, Standards of measurements. | 1 | 16.03.18 |  | 1 | Prof. JAB |
| **6** | **Unit 6: Linear and angular measurements:** | **7** |  |  |  |  |
| A | Working principle , constriction , Measurement prouder, error and elimination, limitations and calibration of Vernier Calliper | 1 | 31.01.18 |  | 1, 3 | Prof.NPN |
| B | " of Micrometer | 1 | 01.02.18 |  | 1, 3 | Prof.NPN |
| C | Miscellaneous linear measuring instruments | 1 | 07.02.18 |  | 1, 3 | Prof.NPN |
| D | Dial gauge indicator | 1 | 08.02.18 |  | 1, 3 | Prof.NPN |
| E | Working principle , constriction , Measurement prouder, error and elimination, limitations and calibration angular measuring instrument Sine Bar | 1 | 14.02.18 |  | 1, 3 | Prof.NPN |
| F | Bevel Protector | 1 | 15.02.18 |  | 1, 3 | Prof.NPN |
| G | Miscellaneous angular measuring instruments | 1 | 21.02.18 |  | 1, 3 | Prof.NPN |
| **7** | **Unit 7: Metrology of Gears and screw threads** | **6** |  |  |  |  |
| A | Gear tooth terminology, Sources of errors in manufacturing of gears, Measurement of tooth thickness: Gear tooth vernier | 1 | 22.02.18 |  | 1, 3 | Prof.NPN |
| B | Constant chord method, Addendum comparator method and Base tangent method | 1 | 28.02.18 |  | 1, 3 | Prof.NPN |
| C | Measurement of tooth profile: Tool maker’s microscope or projector, Involute tester | 1 | 01.03.18 |  | 1, 3 | Prof.NPN |
| D | Measurement of concentricity, Alignment of gears. | 1 | 07.03.18 |  | 1, 3 | Prof.NPN |
| E | Screw Thread Measurement: Errors in threads, screw thread gauges, measurement of element of the external, | 1 | 08.03.18 |  | 1, 3 | Prof.NPN |
| F | Measurement of element of the internal threads, thread caliper gauges Alignment testing | 1 | 14.03.18 |  | 1, 3 | Prof.NPN |
| **8** | **Unit 8: Metrology of Surface finish** | **6** |  |  |  |  |
| A | Surface Metrology Concepts and terminology, Analysis of surface traces, , | 1 | 15.03.18 |  | 1 | Prof.NPN |
| B | Specification of surface Texture characteristics | 1 | 21.03.18 |  | 1 | Prof.NPN |
| C | Method of measuring surface finish: Stylus system of measurement | 1 | 22.03.18 |  | 1 | Prof.NPN |
| D | Specification of surface Texture characteristics, and Method of measuring surface finish: | 1 | 28.03.18 |  | 1 | Prof.NPN |
| E | Stylus system of measurement other methods for measuring surface roughness: | 1 | 29.03.18 |  | 1 | Prof.NPN |
| F | Pneumatic method, Light Interference microscopes, Mecrin Instruments. | 1 | 04.04.18 |  | 1 | Prof.NPN |
| **9** | **Unit 9: Comparators** | **3** |  |  |  |  |
| A | Functional Requirements, Classification, Mechanical Comparators | 1 | 23.03.18 |  | 1 | Prof. JAB |
| B | Mechanical Optical Comparators | 1 | 06.04.18 |  | 1 | Prof. JAB |
| C | Electrical Comparators, Pneumatic Comparators | 1 | 13.04.18 |  | 1 | Prof. JAB |
| **10** | **Unit 10: Miscellaneous Metrology** | **6** |  |  |  |  |
| A | Precision instrumentation based on laser principles, coordinate measuring machines | 1 | 05.04.18 |  | 1 | Prof.NPN |
| B | Structure, modes of operation, probe operation and applications | 1 | 11.04.18 |  | 1 | Prof.NPN |
| C | Optical measuring techniques, tool makers microscope, profile projector | 1 | 12.04.18 |  | 1 | Prof.NPN |
| D | Optical square, basic of optical interference and interferometer, optoelectronic measurements | 1 | 18.04.18 |  | 1 | Prof.NPN |
| E | Pressure measurement, bourdon tube, diaphragm, bellow pressure gauge | 1 | 19.04.18 |  | 1 | Prof.NPN |
| F | Dead weight tester, ionization gauges | 1 | 20.04.18 |  | 1 | Prof.JAB |
| **Teaching Aid Code:** | |  |  |  |  |  |
| 1 | O.H.P √ |  |  |  |  |  |
| 2 | L.C.D PROJECTER | Sign of Teacher : Prof. N P Nirmal Prof. J A Bhoi | | | | |
| 3 | MODEL √ |  |  |  |  |  |
| 4 | CHART |  |  |  |  |  |
| 5 | OTHER (VIDEO) √ |  |  | Sign of H.O.D : \_\_\_\_\_\_\_\_\_\_\_ | | |
| ***\* Remark column should cover any slippages and remedial action planned*** | | | | | | |
| LESSON PLANNING, Rev. no. :00 | | | Page no.:7of 9 | | | |

**Reference Books:**

1. Engineering Metrology and Measurement, N V Raghavendra and Krishnamurthy, Oxford University Press,

2. Engineering Metrology and Measurements, Bentley, Pearson Education

3. Theory and Design for Mechanical Measurements, 3rd Edition, Richard S Figliola, Donald E Beasley, Wiley India

4. Metrology and Measurement, Anand Bewoor & Vinay Kulkarni McGraw-Hill

5. Doebelin's Measurement Systems Ernest Doebelin, Dhanesh Manik McGraw-Hill

6. Instrumentation, Measurement and Analysis, B.C. Nakra, K.K. Chaudhry McGraw-Hill

7. A Text book of Engineering Metrology, I C Gupta, Dhanpat Rai Publications

8. A course in Mechanical Measurements and Instrumentation, A K Sawhney, Dhanpat Rai Publications

9. Mechanical Measurements and Instrumentations, Er. R K Rajput, Kataria Publication(KATSON)

10. Mechanical Measurement and Metrology by R K Jain, Khanna PublisherMechanical Measurement & Control by D.S. Kumar.

11. Industrial Instrumentation & Control by S K Singh, McGrawHill

12. Mechanical Measurements by Beckwith & Buck, Narosa publishing House

13. A textbook of Metrology by M. Mahajan, Dhanpat rai & Co.

14. Mechanical measurement and metrology by J.P. Hadiy, H.G. Katariya, Books India Publicationis.

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| **SHANTILAL SHAH ENGINEERING COLLEGE BHAVNAGAR**  **Department of Mechanical Engineering** | | | | | | | | |
| **Lesson Plan (Practical)** | | | | | | | | |
| **Academic Year : 2016-17 Second Term** | | | | **Sem. : 4th sem** | | | | |
| **Name of Teacher : A1, B1 Prof. NPN & A2, A3, B2 Prof. PHS** | | | | **Name of Department : Production Engineering** | | | | |
| **Subject : Mechanical Measurement and Metrology** | | | | **Hrs./Week : 2 Hrs/Week** | | | | |
| **Theory/Tutorial/Practical : Practical** | | | | **Days :** | | | | |
| **Sr. No.** | | **Name of Unit/Topics** | **Hrs. Allotted** | **Batch** | **Planned Date** | **Actual Date** | **Teaching Aid Code** | **Remarks** |
|  | | Basic understanding of measurements and metrology: concepts, application, advantage and future aspects. | 2 | A1 | 28.12.17 |  | **1** | Prof. NPN |
| A2 | 28.12.17 |  | Prof. PHS |
| A3 | 28.12.17 |  | Prof. PHS |
| B1 | 27.12.17 |  | Prof. NPN |
| B2 | 27.12.17 |  | Prof. PHS |
|  | | Linear measurement check different characteristics of linear measurements. | 2 | A1 | 04.01.18 |  | **1, 3** | Prof. NPN |
| A2 | 04.01.18 |  | Prof. PHS |
| A3 | 04.01.18 |  | Prof. PHS |
| B1 | 03.01.18 |  | Prof. NPN |
| B2 | 03.01.18 |  | Prof. PHS |
|  | | Linear measurement check different characteristics of linear measurements. | 2 | A1 | 11.01.18 |  | **1, 3** | Prof. NPN |
| A2 | 11.01.18 |  | Prof. PHS |
| A3 | 11.01.18 |  | Prof. PHS |
| B1 | 10.01.18 |  | Prof. NPN |
| B2 | 10.01.18 |  | Prof. PHS |
|  | | Angular measurement check different characteristics of angular measurements. | 2 | A1 | 18.01.18 |  | **1, 3** | Prof. NPN |
| A2 | 18.01.18 |  | Prof. PHS |
| A3 | 18.01.18 |  | Prof. PHS |
| B1 | 17.01.18 |  | Prof. NPN |
| B2 | 17.01.18 |  | Prof. PHS |
|  | | Angular measurement check different characteristics of angular measurements. | 2 | A1 | 01.02.18 |  | **1, 3** | Prof. NPN |
| A2 | 01.02.18 |  | Prof. PHS |
| A3 | 01.02.18 |  | Prof. PHS |
| B1 | 31.01.18 |  | Prof. NPN |
| B2 | 31.01.18 |  | Prof. PHS |
|  | | Measurement of force, torque and strain | 2 | A1 | 08.02.18 |  | **1** | Prof. NPN |
| A2 | 08.02.18 |  | Prof. PHS |
| A3 | 08.02.18 |  | Prof. PHS |
| B1 | 07.02.18 |  | Prof. NPN |
| B2 | 07.02.18 |  | Prof. PHS |
|  | | Measurement of speed, velocity and acceleration | 2 | A1 | 15.02.18 |  | **1** | Prof. NPN |
| A2 | 15.02.18 |  | Prof. PHS |
| A3 | 15.02.18 |  | Prof. PHS |
| B1 | 14.02.18 |  | Prof. NPN |
| B2 | 14.02.18 |  | Prof. PHS |
|  | | Measurement of temperature | 2 | A1 | 22.02.18 |  | **1** | Prof. NPN |
| A2 | 22.02.18 |  | Prof. PHS |
| A3 | 22.02.18 |  | Prof. PHS |
| B1 | 21.02.18 |  | Prof. NPN |
| B2 | 21.02.18 |  | Prof. PHS |
|  | | Measurement of gear | 2 | A1 | 15.03.18 |  | **1, 3** | Prof. NPN |
| A2 | 15.03.18 |  | Prof. PHS |
| A3 | 15.03.18 |  | Prof. PHS |
| B1 | 14.03.18 |  | Prof. NPN |
| B2 | 14.03.18 |  | Prof. PHS |
|  | | Measurement of screw thread | 2 | A1 | 22.03.18 |  | **1, 3** | Prof. NPN |
| A2 | 22.03.18 |  | Prof. PHS |
| A3 | 22.03.18 |  | Prof. PHS |
| B1 | 21.03.18 |  | Prof. NPN |
| B2 | 21.03.18 |  | Prof. PHS |
|  | | Measurement of screw thread | 2 | A1 | 05.04.18 |  | **1, 3** | Prof. NPN |
| A2 | 05.04.18 |  | Prof. PHS |
| A3 | 05.04.18 |  | Prof. PHS |
| B1 | 28.03.18 |  | Prof. NPN |
| B2 | 28.03.18 |  | Prof. PHS |
|  | | Miscellaneous metrology | 2 | A1 | 12.04.18 |  | **1** | Prof. NPN |
| A2 | 12.04.18 |  | Prof. PHS |
| A3 | 12.04.18 |  | Prof. PHS |
| B1 | 04.04.18 |  | Prof. NPN |
| B2 | 04.04.18 |  | Prof. PHS |
|  | | Miscellaneous metrology | 2 | A1 | 19.04.18 |  | **1** | Prof. NPN |
| A2 | 19.04.18 |  | Prof. PHS |
| A3 | 19.04.18 |  | Prof. PHS |
| B1 | 11.04.18 |  | Prof. NPN |
| B2 | 11.04.18 |  | Prof. PHS |
| **Teaching Aid Code:** | | |  |  | |  |  |  |
| 1 | O.H.P | |  |  | |  |  |  |
| 2 | L.C.D PROJECTER | | Sign of Teacher : Prof. N P Nirmal Prof. P H Solanki | | | | | |
| 3 | MODEL, INSTRUMENT | |  |  | |  |  |  |
| 4 | CHART | |  |  | |  |  |  |
| 5 | OTHER (VIDEO) | |  |  | | Sign of H.O.D : \_\_\_\_\_\_\_\_\_\_\_ | | |
| ***\* Remark column should cover any slippages and remedial action planned*** | | | | | | | | |
| LESSON PLANNING, | | | | Page no.:9 of 9 | | | | |