# Maharashtra State Board of Technical Education, Mumbai TEACHING PLAN (TP)

**D-1**

## Academic Year: 2020–21

**Date:** 15/06/2020

**Institute Name & Code:** Late Annasheb (NIT’S) Polytechnic, Nashik (1479)

**Programme and Code**: Electronics and Telecommunication Engg. **Course Index:** 304

**Course Name**: Electronics Measurements and Instrumentation **Course Abbr-Code**: EMI-22333

**Semester**: **IIIrd Scheme**: ‘I’ **Allocated Hrs:** 64 **Name of Faculty**: Mrs.S.K.Khaire

# Class: SYEJ

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## Course Objectives:

* 1. Understand fundamentals of measuring Instruments and characteristics of measuring instrument.
  2. Understand and describe different types of Standards and classification of instruments.
  3. Calibrate measuring instruments and convert low range instruments to high range.
  4. Compare different types of Instruments and apply knowledge to use test and measurement instruments
  5. Understand Data acquisition

## Course Outcomes (COs) and Unit Outcomes: Theory & Practical

By learning course Electronics Measurements and Instrumentation (EMI-22333), Second Year students will be able to:

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| **CO No.** | **UO No.** | **Course Outcomes (COs) / Unit Outcomes (UOs)** |
| **CO304.1** |  | **Fundamental of electronics measurements.** |
|  | 1a | **Classify the given measuring instruments.** |
| 1b | **Determine static and dynamic characteristics of measuring instruments with** |
| 1c | **Identify the standards for calibration of the given instrument with the** |
| 1d | **Explain with sketches the generalized procedure for calibration of the given** |
| **CO304.2** |  | **Analog and Digital meters** |
|  | 2a | **Determine resolution ,sensitivity and accuracy of the given digital display.** |
| 2b | **Convert the PMMC instrument into DC ammeter/DC Voltmeter for the** |
| 2c | **Explain with the sketches the working of given type of ohm meter and AC** |
| 2d | **Prepare specification of the given analog meter.** |
| 2e | **Determine resolution, sensitivity and accuracy of the given digital display.** |
| **CO304.3** |  | **Oscilloscope, Function generator, and Spectrum analyzer** |
|  | 3a | **Explain with sketches the working of the given blocks and types of** |
| 3b | **Explain with sketches the procedure to measure the given parameters using** |
| 3c | **Describe the function of the given blocks of signal/function.** |
| 3d | **Explain with sketches the procedure to test the given types of signals using** |
| 3e | **Explain with sketches the working of the given blocks and types of** |
| **CO304.4** |  | **Sensors and Transducers** |
|  | 4a | **Describe the function of the given block of instrumentation system with the** |
| 4b | **Select relevant transducers for given application with justification.** |
| 4c | **Differentiate the features transducers and sensors for the given quantity** |

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|  | 4d | **Explain with sketches the working principle of given type of thermal sensor.** |
| **CO304.5** |  | **Applications of sensors and transducers** |
|  | 5a | **Explain with sketches the working principle of the given transducers.** |
| 5b | **Select suitable transducer for the given level measurement with justification.** |
| 5c | **Select the relevant sensor for the given range of pressure/temperature** |
| 5d | **Select the relevant sensor /transducer for the specified application with** |
| 5e | **Explain with sketches the working principle of the given transducers.** |
| **CO304.6** |  | **Signal conditioning and data acquisition system.** |
|  | 6a | **Explain the need of signal conditioning for the given measurement.** |
|  | 6b | **Differentiate between the given block of AC and DC signal conditioning** |
|  | 6c | **Describe function of the given block of DAS.** |
|  | 6d | **Explain with sketches the working of data acquisition system for the specified** |
|  | 6e | **Explain the need of signal conditioning for the given measurement.** |

* Teaching Plan:

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| **Unit No.**  **(Allotted Hrs.)** | **Objectives** | **Title/Topic Details and Course Outcome (CO)** | **Plan**  **(From - To**  **& No. of Lectures)** | **Actual Execution (From-To & No. of Lectures)** | **Teaching Method/ Media/ Tools** | **Remark** |
|  | 1a | 1.1 Fundamentals of electronic measurements: Classify the given measuring instrument.  . | 18/06/2020  to 19/06/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | (02) | video |  |
| **01.** | 1b | 1.2 Characteristics of measurement: static and  dynamics characteristics, error in measurement, Types of errors: determine static and dynamic | 19/06/2020  to 25/06/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
| **(08)** |  |  | (03) | video |  |
|  | 1c | * 1. Standards of measurements: identify the standards for calibration of the given instruments with justification.   2. Calibration:   Need and meaning of calibration: Explain with sketches the generalised procedure for calibration of the given instrument.**1.7** Classification of Network: LAN, WAN, MAN | 26/06/2020  to 27/06/2020 (03) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | 2a | 2.1 Indicating and display  Device: D’Arsonval movement, PMMC, moving iron, LCD,LED: determine resolution, sensitivity and accuracy of the given digital display | 02/07/2019  to 04/07/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  | (04) | video |  |
| **02.**  **(14)** | 2b | 2.2 Analog and Digital meters: Type of analog and digital meters, voltmeter, ammeter, ohm meter, extension of measuring range of meters, applications of meters, calibration of meters. | 09/07/2020  to  11/07/2020 (04) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | 2c | Convert the PMMC instrument into DC voltmeter for the given range. | 16/07/2020  to 18/07/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | (03) | video |  |

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|  | 2d, 2e | Explain with sketches the working of given type of ohm meter, AC voltmeter  Prepare specification of the given Analog meter | 18/07/2020  to 24/07/2020 (03) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | 3a | 3.1 CRO: Block diagram of CRO, CRT, vertical deflection system and horizontal deflection system, need of delay line, time base generator, amplitude and frequency measurement using CRO, liassajous patterns for phase and frequency measurement, component testing using CRO, dual trace and dual beam CRO: Explain with sketches the working of the given blocks and type of oscilloscope. | 25/07/2020  to 31/07/2020  (04) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | 3b | 3.2 DSO: Block diagram of DSO, various function and applications of DSO: Explain with sketches the procedure to measure the parameters using CRO | 01/08/2020  to 06/08/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | (03) | video |  |
| **03.** |  |  |  |  |  |
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| **(14)** | 3c | 3.3 Function generator : block diagram of function generator: describe the function of the given blocks of signal/ function generator | 07/08/2020  to 08/08/2020 | Google meet/class room/pade lt.com. | Online  teaching for home |
|  |  |  | (03) | video |  |
|  | 3d | 3.4 spectrum analyser :block diagram of spectrum analyser and its applications :explain with sketches the procedure to test the given types of signals using the relevant type test and measuring instrument | 13/08/2020  to 14/08/2020 (02) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | 3e/ 3f | 3.5select CRO/DSO, spectrum analyser and function generator for specified application with justification.  Prepare specification for the given instrument. | 20/08/2020  to 21/08/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | (02) | video |  |
| **04.**  **(10)** | 4a, 4b | 4.1 Instrumentation System Block diagram of instrumentation system, function of each block: describe the function of the given block of instrumentation system with the help of suitable block diagram. | 22/08/2020  to 28/08/2020 |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  |  |  | (04) |  |  |

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|  |  |  | 29/08/2020 |  |  |  |
| 4.2 Sensors and transducers: basic Definition, difference, classification of sensor: select relevant transducers for given application with  justification. | to 29/08/2020 |
|  | (02) |
| 4c, 4d  4e | * 1. thermal, optical, magnetic and electric sensors: differentiate the features transducers and sensors for given quality measurement.   2. Transducer: need of transducer, types of transducer: primary, secondary, active, passive, analog, digital, resistive, capacitive, and inductive (LVDT, RVDT), piezoelectric transducer, selection criteria of transducer: explain with sketches the working principle of given type of thermal sensor. | 03/09/2020  to 11/09/2020 (06) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | Select the relevant transducer for the given range of displacement measurement with justification. |  |  |  |
|  | 5a, 5b | * 1. level measurements: need of level measurement, float type, capacitive Type, working principle, construction of each: Explain with sketches the working principle of the given transducers.   2. temperature measurement: thermistor, RTD (P1-100), thermocouple: seeback and peltier effects(J,K,R,S,T types),optical pyrometer: select suitable transducer transducer for the given level measurement with justification. | 12/09/2020  to 19/09/2020 (05) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
| **05.** |  |  |  |  |  |
| **(12)** | 5c | 5.3 pressure measurement: types, bourdon tube, bellows, diaphragm, pressure measurement using bourdon tube and LVDT. | 19/09/2020  to 24/09/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | (02) | video |  |
|  | 5d | 5.4 flow measurement: types, variable head flow meter: venturimeter, orifice plate meter, variable area flow meter: rota meter electromagnetic flow meter, ultrasonic flow meter: select the relevant transducer for the given range of pressure measurement with justification. | 25/09/2020  to  26/09/2020 (03) |  | Google meet/class room/pade lt.com.  video | Online teaching for home |
|  | 5e | 5.5 Special transducers and measurement: humidity measurement using hygrometer, pH measurement: select the relevant sensor/transducer for the specified application with justification. | 01/10/2020  to 03/10/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |

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|  |  |  | (02) |  | video |  |
| 6(6) | 6a | 6.1 signal conditioning: need of signal Conditioning, types of block signal conditioning  ,block diagram of AC and DC signal conditioning circuits: explain the need of signal conditioning for the given measurement. | 03/10/2020  to 08/10/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | 2 |  |  |
|  | 6b | 6.2 data Acquisition system (DAS): type of DAS, application of DAS with example: Differentiate between the given block of AC and DC signal conditioning circuits. | 09/10/2020  to 10/10/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
|  |  |  | 2 |  |  |
|  | 6c | Describe function of the given block of DAS. | 10/10/2020  to  10/10/2020 |  | Google meet/class  room/pade lt.com. | Online teaching for home |
|  |  |  | 1 |  |  |
|  | 6d | Explain with sketches the working of data acquisition system for the specified application. | 15/10/2020  to 15/10/2020 |  | Google meet/class room/pade lt.com. | Online teaching for home |
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|  |  | **Total** | 64 |  |  |  |

###  Chapter wise CO Mapping:

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|  | **CO304.1** | **CO304.2** | **CO304.3** | **CO304.4** | **CO304.5** | **CO304.5** |
| **Chapter 1** |  |  |  |  |  |  |
| **Chapter 2** |  |  |  |  |  |  |
| **Chapter 3** |  |  |  |  |  |  |
| **Chapter 4** |  |  |  |  |  |  |
| **Chapter 5** |  |  |  |  |  |  |

* **Direct Assessment Criteria:**
  + **Rules for Theory Assessment:**

1. Weekly Test may be conducted in Google class/ERP. Student can’t access any study material during test.
2. An MCQ Test may be conducted in Google Quiz/ERP. Student can access any material during test.
3. Total weightage of Theory Marks to the Course is 100. From 100 Marks 70 Marks are allotted to MSBTE TH Examination and 30 Marks are allotted to Theory Progressive Assessment (PA).
4. Under the theory PA; out of 30 Marks, 20 marks of theory PA are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 test taken during the semester
5. MSBTE Theory Examination of 70 marks will be conducted by MSBTE at the end of semester. The schedule of MSBTE Examinations will be announced by MSBTE on the website [www.msbte.com.](http://www.msbte.com/)

###  Rules for Practical assessment:

**Practicals may be conducted by means of virtual laboratory ,Video and demo online.**

* 1. Progressive Assessment (P.A.) of each experiment will be done out of 25 marks on the basis of Use of appropriate tool to solve the problem, Quality of output achieved, Answer to sample questions and Submit report in time
  2. Final term work of 50 marks is calculated based on Progressive Assessment for each experiment
  3. Term Work Marks = ((Total Marks Obtained in P.A.) / (25 x Total Number of Experiments)) \*25
  4. A comprehensive Final Practical End Semester examination (of 50 Marks) will be conducted by MSBTE at the end of semester. Examiner for this examination will be appointed by MSBTE. The schedule of MSBTE Practical Examination will be display on Notice board prior to examination

###  References:

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No** | **TITLE** | **Author** | **Publisher** |
| 01 | Electrical and Electronic Measurements and Instrumentation | Sawhney,A.K. | Dhanpatrai ISBN:13- 9788177000160 |
| 02 | Electronic Instrumentation | Kalsi H.S. | Hill,New Delhi. Computer Networks PHI Learning Pvt. Ltd. Delhi, ISBN-13:978-0-13- 212695-3 |
| 03 | Electronic Instrumentation and Measurements | David A.Bell | Oxford University Press , New Delhi |
| 04 | Modern Electronic Instrumentation and Measurement Techniques. | :Helfrick,A.D.,Cooper, W.D. | . Pearson Education India |

** Web References:**

1. https:[//w](http://www.instrumentationcontrol.com/)ww[.instrumentationcontrol.com](http://www.instrumentationcontrol.com/)
2. https:/[/w](http://www.circuitstoday.com/)w[w.circuitstoday.com](http://www.circuitstoday.com/)
3. https://www.myklassroom/Engineering.../Electronics-&Instumentation-Engg.-(EIE) 4

https:[//w](http://www.en.wikipedia.org/wiki/List_of_electrical_and_electronic_measruing_equipment)ww[.en.wikipedia.org/wiki/List\_of\_electrical\_and\_electronic\_measruing\_equipment](http://www.en.wikipedia.org/wiki/List_of_electrical_and_electronic_measruing_equipment)

1. https:[//w](http://www.en.wikipedia.org/wiki/Electronic_test_equipment)ww[.en.wikipedia.org/wiki/Electronic\_test\_equipment](http://www.en.wikipedia.org/wiki/Electronic_test_equipment)
2. https:[//w](http://www.en.wikibooks.org/wiki/Electronics/)ww[.en.wikibooks.org/wiki/Electronics/](http://www.en.wikibooks.org/wiki/Electronics/)

Mrs.S.K.Khaire Mrs.S.K.Khaire

### (Name & signature of staff) (Name & signature of HOD)