

Subject Teacher : Shuva Sarker (Jr. Instructor)  
 Subject Name : Telecom Measuring & Equipments Testing  
 Subject Code : 69452  
 Technology : Telecommunication Technology  
 Semester : 5<sup>th</sup>  
 BTB Text Book Name : Telecom Measuring & Equipments Testing  
 Reference Book/Note Name: Electrical and Electronic Measurements and Instrumentation - A K Sawhney)

### AIMS

To provides the students with an opportunity to develop knowledge, skill and attitude in the area of Telecom measuring and testing equipment with the special emphasis on:

- Qualities of Measurements
- Analog and digital meters
- Voltmeters
- Digital display system
- Digital instruments
- Oscilloscope
- Special types of measuring Instruments
- Signal Generator
- Wave Analyzer and Recorders
- Special types of Testing Equipments

| Marks | Grade Point | Letter Grade | Marks | Grade Point | Letter Grade |
|-------|-------------|--------------|-------|-------------|--------------|
| 80>   | 4.00        | A+           | 55-59 | 2.75        | B-           |
| 75-79 | 3.75        | A            | 50-54 | 2.50        | C+           |
| 70-74 | 3.50        | A-           | 45-49 | 2.25        | C            |
| 65-69 | 3.25        | B+           | 40-44 | 2.00        | D            |
| 60-64 | 3.00        | B            | 0-39  | 0.00        | F            |

| Mark Distribution (for 200Marks) |            |                 |           |
|----------------------------------|------------|-----------------|-----------|
| Theory Marks                     |            | Practical Marks |           |
| Midterm                          | 30         | PC              | 25        |
| Class test                       | 20         | PF              | 25        |
| Quiz test                        | 10         | -               | -         |
| Final                            | 90         | -               | -         |
| <b>Total</b>                     | <b>150</b> | <b>Total</b>    | <b>50</b> |

| Class Timing Distribution                           |            |
|-----------------------------------------------------|------------|
| Particulars                                         | Time       |
| Greeting with students                              | 10 Minutes |
| Previous Class Review                               | 10 Minutes |
| Present Class Topic Discussion and Lecture Delivery | 50 Minutes |
| Present Class Topics Review                         | 20 Minutes |

|  | Lecture | Chapter/ Exam / Industrial Visit               | Learning Area                                                                                                                                | Learning Outcome                                                                                                                            | Class/Lab Supporting Equipment's       |
|--|---------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
|  | 1       | <b>1. Understand qualities of measurements</b> | 1.1 Define the term measuring instruments.<br>1.2 Explain the static Characteristics with classifications.<br>1.3 Discuss the static errors. | * Understand the concept static errors.<br>*Dynamic Characteristics, static Characteristics<br>* To know about the different types of error | Theory, Ammeter, Voltmeter, Oscillator |
|  | 2       | <b>1. Understand qualities of measurements</b> | 1.4 State the Dynamic Characteristics.<br>1.5 Describe the different types of error in measurements with problem solutions                   | * To able to understand the                                                                                                                 | Theory, Ammeter, Voltmeter, Oscillator |

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| 3  | <b>1. Understand qualities of measurements</b>                      | 1.6 Explain the source of errors<br>1.7 Define the factors validity, reliability, repeatability, accuracy, precision and resolution etc.                                                         | factors validity, reliability, repeatability, accuracy, precision                                                                           | Theory, Ammeter, Voltmeter, Oscillator                                 |
| 4  | <b>Class Test-01</b>                                                | <b>Chapter-01</b>                                                                                                                                                                                | <b>Total marks-10 pass -06</b>                                                                                                              |                                                                        |
| 5  | <b>2.Understand the basic features of Analog and digital meters</b> | 2.1 Mention the different types of analog measuring instruments.<br>2.2 Describe the working principles of permanent magnet moving coil (PMMC) instruments.                                      | * Understand the operation of multi meter (AVO meter).<br>* Understand the range for Ammeter ,Voltmeters and Understand the PMMC.           | Projector, Internet, Ammeter Galvanometer and Voltmeters.              |
| 6  | <b>2.Understand the basic features of Analog and digital meters</b> | 2.3 Describe the working principles of permanent magnet moving Iron instruments.<br>2.4 Describe the operation of multi meter (AVO meter).<br>2.5 Describe the operation of digital multi meter. |                                                                                                                                             | Projector, Internet, Ammeter Galvanometer and Voltmeters.              |
| 7  | <b>2.Understand the basic features of Analog and digital meters</b> | 2.6 Describe the operation of Clip on meter.<br>2.7 State the operation of electronic counter. 2.8 State the operation of digital frequency meter (Microwave range).                             |                                                                                                                                             | Projector, Internet, Ammeter Galvanometer and Voltmeters.              |
| 8  | <b>2.Understand the basic features of Analog and digital meters</b> | 2.9 Explain the extension of range for Ammeter and Voltmeters.<br>2.10 Solve the problems on range extension for Ammeter and Voltmeters                                                          |                                                                                                                                             | Projector, Internet, Ammeter Galvanometer and Voltmeters.              |
| 9* | <b>QuizTest-01</b>                                                  | <b>Chapter-02</b>                                                                                                                                                                                |                                                                                                                                             |                                                                        |
| 10 | <b>Practrical-01</b>                                                | <b>Perform the measurement of voltage, Time period and frequency using a Cathode Ray Oscilloscope (CRO)</b>                                                                                      | They can understand about voltage, Time period and frequency using a Cathode Ray Oscilloscope (CRO)                                         | Projector, Internet, A-meter Galvanometer and Voltmeters Oscilloscope. |
| 11 | <b>3. Understand the basic features of Voltmeter</b>                | 3.1 Describe the basic principle of D.C Voltmeter.<br>3.2 Describe the operation of multi range Voltmeter.<br>3.3 Describe the operation of Transistor Voltmeter (TVM).                          | They can understand about the basic principle of D.C Voltmeter the operation of multi range Voltmeter the operation of Transistor Voltmeter | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire   |
| 12 | <b>3. Understand the basic features of Voltmeter</b>                | 3.4 Describe the operation of differential Voltmeter.<br>3.5 Describe the operation of AC milli voltmeter with block diagram.                                                                    |                                                                                                                                             | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire   |
| 13 | <b>Quiz Test-02</b>                                                 | <b>Chapter-03</b>                                                                                                                                                                                | <b>Total marks-10 pass -06</b>                                                                                                              |                                                                        |

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| 14 | <b>Practrical-02</b>                                         | <b>Perform the measurement of the Frequency using Digital Frequency Counter.</b>                                                                                                               |                                                                                                                                                              |                                                                                                                       |
| 15 | <b>4. Understand the features of digital display system.</b> | 4.1 Mention the different types of digital display system.<br>4.2 Describe the construction of Liquid Crystal Display.<br>4.3 Describe the construction of Light Emitting Diode.               | They can understand about the different types of digital display system the construction of Liquid Crystal Display the construction of Light Emitting Diode, | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 16 | <b>4. Understand the features of digital display system.</b> | 4.4 Explain the function of multi digit display system.<br>4.5 Describe the construction of Segmental displays using LEDs.                                                                     |                                                                                                                                                              | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 17 | <b>4. Understand the features of digital display system.</b> | 4.6 Explain the function of Dot matrix and LASER displays.<br>4.7 Describe the construction of Liquid vapor display (LVD).                                                                     |                                                                                                                                                              | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 18 | <b>Practrical-03</b>                                         | <b>Perform the Operation of a Function Generator.</b>                                                                                                                                          | They can know the Operation of a Function Generator                                                                                                          | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 19 | <b>Class Test-02</b>                                         | <b>Chapter-04</b>                                                                                                                                                                              | <b>Total marks-10 pass -06</b>                                                                                                                               |                                                                                                                       |
| 20 | <b>5.Understand the features of Oscilloscope</b>             | 5.1 State the basic principles Cathode Ray Tube (CRT).<br>5.2 Explain the function of Block diagram of Oscilloscope.<br>5.3 Explain the function of Dual Beam CRO and Dual trace Oscilloscope. | They can understand about the basic principles Cathode Ray Tube (CRT), measurement procedure of voltage by the Oscilloscope.                                 | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 21 | <b>5.Understand the features of Oscilloscope</b>             | 5.4 Describe the block diagram and function of the Digital Storage Oscilloscope (DSO).<br>5.5 Explain the measurement procedure of voltage by the Oscilloscope.                                |                                                                                                                                                              | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 22 | <b>5.Understand the features of Oscilloscope</b>             | 5.6 Explain the measurement procedure of Frequency and phase angle by Lissajous Method.<br>5.7 Describe function of the different types of probes.                                             |                                                                                                                                                              | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 23 | <b>Quiz Test-03</b>                                          | <b>Chapter-05</b>                                                                                                                                                                              | <b>Total marks-10 pass -06</b>                                                                                                                               |                                                                                                                       |

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| 24 | <b>6.Understand the features of special types of measuring Instruments</b> | 6.1 Describe the construction and operations of the Megger.<br>6.2 Explain the pH measurements using Hydrogen Electrodes.                                             | They can understand about the construction and operations of the Megger. construction and operations of the RX meter    | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 25 | <b>Practrical-04</b>                                                       | <b>Perform the measurement of the Resistance, Inductance and Capacitance using RLC Bridge.</b>                                                                        |                                                                                                                         |                                                                                                                       |
| 26 | <b>6.Understand the features of special types of measuring Instruments</b> | 6.3 Describe the construction and operations of the RX meter<br>6.4 Describe the construction and operations of the Q meter                                           |                                                                                                                         | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 27 | <b>6.Understand the features of special types of measuring Instruments</b> | 6.5 Explain the measurement of characteristic impedance ( $Z_0$ ) of a transmission line using Q meter.<br>6.6 Describe the construction of LCR Bridge (Skeleton type | They can understand about the measurement of characteristic impedance, principles of VSWR meter.                        | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 28 | <b>6.Understand the features of special types of measuring Instruments</b> | 6.7 Describe the basic principles of VSWR meter.<br>6.8 State the operation of Transistor tester and IC tester.                                                       |                                                                                                                         | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 29 | <b>Practrical-05</b>                                                       | <b>Perform the measurement of optical fiber power with Optical Power meter.</b>                                                                                       |                                                                                                                         | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays             |
| 30 | <b>Class Test-03</b>                                                       | <b>Chapter-01</b>                                                                                                                                                     | <b>Total marks-10 pass -06</b>                                                                                          |                                                                                                                       |
|    | <b>Mid Term</b>                                                            |                                                                                                                                                                       |                                                                                                                         |                                                                                                                       |
| 31 | <b>7. Understand the features of Signal Generator</b>                      | 7.1 Describe the construction and operations of the Conventional standard Signal Generator.<br>7.2 State the operation of AF sine and Square wave Signal Generator.   | They can understand about the operation of AF sine and Square wave Signal Generator ,the Block diagram and the function | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |

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| 32 | <b>7. Understand the features of Signal Generator</b>            | 7.3 Describe the construction and operations of the Function Generator.<br>7.4 State the Block diagram and the function of a pulse Generator.<br>7.5 State the Block diagram of the Wobbluscope |                                                                                                                                                           | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 33 | <b>Practrical-06</b>                                             | <b>Observe the operation of a Digital Display Unit.</b>                                                                                                                                         | They can understand about operation of a Digital Display Unit                                                                                             | Dot matrix and LASER displays                                                                                         |
| 34 | <b>Quiz Test-04</b>                                              | <b>Chapter-07</b>                                                                                                                                                                               | <b>Total marks-10 pass -06</b>                                                                                                                            |                                                                                                                       |
| 35 | <b>8. Understand the features of Wave Analyzer and Recorders</b> | 8.1 Describe the operations of the basic wave analyzer.<br>8.2 Describe the construction and operations of the Frequency Selective wave analyzer.                                               | They can understand about the operations of the basic wave analyzer                                                                                       | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 36 | <b>8. Understand the features of Wave Analyzer and Recorders</b> | 8.3 Describe the construction and operations of the RF heterodyne wave analyzer.<br>8.4 Describe the construction and operations of the RF Spectrum wave analyzer.                              | They can understand about the construction and operations of the RF heterodyne wave analyzer                                                              | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 37 | <b>8. Understand the features of Wave Analyzer and Recorders</b> | 8.5 Describe the construction and operations of the basic strip chart Recorder.<br>8.6 Describe the construction and operations of the Potentiometric Recorder.                                 | They can understand about the construction and operations of the basic strip chart Recorder<br>basic components of a tape recorder and Magnetic Recording | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 38 | <b>8. Understand the features of Wave Analyzer and Recorders</b> | 8.7 State the Block diagram and the function of X- Y Recorder.<br>8.8 State the basic components of a tape recorder and Magnetic Recording.                                                     |                                                                                                                                                           | D.C Voltmeter, Voltmeter, Transistor, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |
| 39 | <b>Class Test-04</b>                                             | <b>Chapter-01</b>                                                                                                                                                                               | <b>Total marks-10 pass -06</b>                                                                                                                            |                                                                                                                       |
| 40 | <b>9. Understand the features of special testing equipment's</b> | 9.1 Describe the construction and operations of the Bit Error Rate (BER) meter.<br>9.2 Describe the construction and operations of the Mobile /Cellular Test set.                               | They can understand about the construction and operations of the Bit Error Rate (BER) meter                                                               | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays             |
| 41 | <b>9. Understand the features of special testing equipment's</b> | 9.3 List the common faults occurring in mobile set and its Remedy.<br>9.4 Describe the operations of Pulse Code Modulation (PCM) Analyzer.                                                      | They can understand about the common faults occurring in mobile set and its Remedy, operations of Optical Signal                                          | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays             |

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|  | 42         | Practrical-07                                                        | Perform the measurement of the separate Resistive and Reactive components by RX meter.                                                                                                                                                 | Generator (Optical Source) meter                                                                                                  |                                                                                                           | Measurement of Sound and data Acquisition system |
|  | 43         | 9.Understand the features of special testing equipment's             | 9.5 Describe the operations of Optical Signal Generator (Optical Source) meter.<br>9.6 Describe the operations of Optical Signal measurement (Optical Power) meter.<br>9.7 Describe the operations of Wire shark for network analyzing |                                                                                                                                   | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |                                                  |
|  | 44         | Class Test-05                                                        | Chapter-09                                                                                                                                                                                                                             | Total marks-10 pass -06                                                                                                           |                                                                                                           |                                                  |
|  | 45         | 10. Understand the Measurement of sound and Data acquisition systems | 10.1 Describe the measuring process of sound using Microphones.<br>10.2 Describe the Measurements of thickness using ultrasonic Vibrations.                                                                                            | They can understand about the measuring process of sound using Microphones, generalized data acquisition systems.                 | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |                                                  |
|  | 46         | 10. Understand the Measurement of sound and Data acquisition systems | 10.3 Explain the process of generalized data acquisition systems.                                                                                                                                                                      |                                                                                                                                   | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |                                                  |
|  | 47         | 10. Understand the Measurement of sound and Data acquisition systems | 10.4 List the components of data acquisition systems.<br>10.5 Describe the digital data recording system using Analog/Digital Recorder.                                                                                                | They can understand about the components of data acquisition systems, digital data recording system using Analog/Digital Recorder | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |                                                  |
|  | 48         | Practrical-08                                                        | Perform the operation of Insulation Tester.                                                                                                                                                                                            | They can understand about the operation of Insulation Tester                                                                      | D.C Voltmeter, Voltmeter, Trainer board, connecting wire ,LED, LCD Display, Dot matrix and LASER displays |                                                  |
|  | 49         |                                                                      | Review Class                                                                                                                                                                                                                           |                                                                                                                                   |                                                                                                           |                                                  |
|  | 50         |                                                                      | Review Class                                                                                                                                                                                                                           |                                                                                                                                   |                                                                                                           |                                                  |
|  | 51         |                                                                      | Review Class                                                                                                                                                                                                                           |                                                                                                                                   |                                                                                                           |                                                  |
|  | Final Exam |                                                                      |                                                                                                                                                                                                                                        |                                                                                                                                   |                                                                                                           |                                                  |