

Lecture Plan-1

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Transducer types	Time Allotted:-
1.	Introduction Transducers are primary sensing elements. Transducer converts one form of energy into another form of energy. There are many types of transducers based on the working principle like Analog and Digital, Active and Passive.	5 min
2	Division of the Topic -Definition of Transducer -Types of Transducers	35 min
3.	Conclusion Transducers are important part of measurement & Instrumentation system and are also applied in Intelligent Instrumentation systems.	5 min
4	Question / Answer Q1 What is a transducer A1 Transducer converts one form of energy into another form of energy Q2 Give an example of active type of transducer A2 Thermocouple	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-2

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Temperature Transducer	Time Allotted:-
1.	<p>Introduction Temperature is very important parameter and temperature sensors cover almost 30% of the total market. Many reactions take place only on some specific temperature so it is very necessary to control temperature. There are a lot of temperature transducers available in the market. Here we will discuss some of those like RTD, Thermistor etc.</p>	5 min
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> -Temperature transducers -Types of temperature transducers 	35 min
3.	<p>Conclusion Temperature transducers help us in measuring the temperature and we can also maintain the desired temperature.</p>	5 min
4	<p>Question / Answer</p> <p>Q1 Which temperature transducer is active type of transducer? A1 Thermocouple Q2 Which one is most accurate temperature transducer? A2 RTD</p>	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-3

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Thermocouple working	Time Allotted:-
1.	Introduction Thermocouple works on thermoelectric laws. It consists of the combination of two metals and it has two junctions; one is called cold junction and other is called hot junction. Temperature to be measured is applied at the hot junction and the cold junction is kept at some reference temperature. The output voltage is proportional to the temperature difference of the two junctions.	5 min
2	Division of the Topic -Thermocouple construction -Thermocouple working -Thermocouple types	35 min
3.	Conclusion Thermocouple is simple in construction and economical to use. This has vast temperature range. But the only disadvantage is that reference junction is required for temperature measurement.	5 min
4	Question / Answer Q1 Thermocouple works on which effect? A1 See back effect Q2 Thermocouple is active transducer or passive A2 Active	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
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Lecture Plan-4

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Thermistor working	Time Allotted:-
1.	Introduction Thermistor is also a temperature sensor and it is having greater sensitivity as compared to the thermocouple. Generally it has negative temperature coefficient of resistance.	5 min
2	Division of the Topic -Thermistor working -Comparison of Thermistor with other temperature sensors	35 min
3.	Conclusion Thermistor can useful in measurement of temp. but in limited range of temp . It has got advantage for its compactness.	5 min
4	Question / Answer Q. 1 What are the types of Thermistor? A1 Bead, Probe, Disc and Rod Q2 Thermistor is active or passive transducer? A2 Passive	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-5

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- RTD working	Time Allotted:-
1.	Introduction RTD means Resistance Temperature Detector. It is most accurate of all the temperature sensors. Generally Platinum is used for RTD which makes it costly. It has positive temperature coefficient of resistance.	5 min
2	Division of the Topic -RTD construction -RTD working -Comparison of RTD with other temperature sensors	35 min
3.	Conclusion RTD helps in measurement of temperature with good accuracy but we generally use Platinum for this and that is costly which makes this transducer costly.	5 min
4	Question / Answer Q1 What are the advantages of RTD? A1 Good Accuracy, Linearity Q2 Which type of transducer is RTD? A2 Resistive	5 min

Assignment to be given: - NIL

Reference Readings:-

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Lecture Plan-6

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Inductive transducer types	Time Allotted:-
1.	Introduction These are those transducers which work on the principle of change in inductance of coil. The inductance may change in many ways like self inductance, mutual inductance etc. LVDT is an example of inductive type of transducer.	5 min
2	Division of the Topic -Principle of inductive transducer -Examples of inductive transducers	35 min
3.	Conclusion Inductive types of transducers are having many advantages like the effect of vibrations is very less.	5 min
4	Question / Answer Q1 Which are different type of inductive transducers? A1 LVDT, RVDT Q2 Which transducer is used for the measurement of rotary displacement? A2 RVDT	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-7

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Capacitive transducer	Time Allotted:-
1.	Introduction Capacitive transducers work on the principle of change in capacitance. The capacitance may change by three reasons i.e. change in overlapping area, change in dielectric material between the plates, change in distance between the plates.	5 min
2	Division of the Topic -Working principle of capacitive transducer -Applications of capacitive transducer	35 min
3.	Conclusion These are having many advantages like compact in size etc. These can also be for the measurement of liquid level.	5 min
4	Question / Answer Q1 Capacitive transducer is active or passive type? A1 Passive Q2 What are various methods by which the capacitance can change? A2 change in overlapping area, change in distance, change in dielectric material.	5 min

Assignment to be given: - NIL

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Lecture Plan-8

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- RVDT & LVDT comparison	Time Allotted:-
1.	Introduction RVDT stands for Rotary Variable Differential Transformer and LVDT stands for Linear Variable Differential Transformer. The basic difference between these is that RVDT is used to measure the rotary displacement and LVDT is used to measure linear displacement.	5 min
2	Division of the Topic -LVDT working principle -RVDT working principle -Comparison between RVDT and LVDT	35 min
3.	Conclusion LVDT & RVDT are used for displacement measurement. These have many advantages like good accuracy etc. LVDT can measure linear displacement in mm also with good accuracy.	5 min
4	Question / Answer Q1 What is LVDT? A1 Linear Variable Differential Transformer. Q2 RVDT is active or passive? A2 Passive	5 min

Assignment to be given: - NIL

Reference Readings:-

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Lecture Plan-9

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Piezoelectric Transducer	Time Allotted:-
1.	<p>Introduction These work on the piezoelectric effect which states that when force is applied on the sides of the piezoelectric material then emf is induced in the material. The piezoelectric materials are generally are of two types; Natural and Synthetic.</p>	5 min
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> -Piezoelectric effect -Types of piezoelectric material 	35 min
3.	<p>Conclusion These are active type of transducers so no external power source is required for their operation.</p>	5 min
4	<p>Question / Answer</p> <p>Q1 Piezoelectric transducers are active or passive? A1 Active type Q2 Piezoelectric transducers are based on which principle? A2 Piezoelectric effect.</p>	5 min

Assignment to be given: - NIL

Reference Readings:-

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Lecture Plan-10

Semester - V Class: - ECE I Course Code: - EE-303 F
Subject: - Electronic Measurement and Instrumentation Section: - D

S. No.	Topic :- Capacitive transducer (Varying dielectric constant)	Time Allotted:-
1.	Introduction These transducers are used for the measurement of rotational motions in accordance with the change in capacitance.	5 min
2	Division of the Topic -Principle of capacitive transducers -Working of capacitive transducers -Applications of capacitive transducers	35 min
3.	Conclusion These have very less loading effect and these require very small force for their operation.	5 min
4	Question / Answer Q1 What are the applications of capacitive transducers? A1 Measurement of displacement, vibrations, pressure etc. Q2 Write any one advantage of these transducers. A2 Good frequency response and less effect of stray magnetic field	5 min

Assignment to be given: - NIL

Reference Readings:-

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- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-11

semester - V

Class: - ECE ICourse Code: - EE-303 FSubject: - Electronic Measurement and InstrumentationSection: - D

S. No.	Topic :- Signal conditioning Device (D.C. block diagram)	Time Allotted:-
1.	Introduction Signal conditioning devices are used in instrumentation systems to modify or improve the output signals (voltage or current) of various transducers. This is necessary so as to make them useful and compatible with next stages. In DC signal conditioning the excitation source used is DC.	5 min
2	Division of the Topic -Introduction to signal conditioning -DC signal conditioning	35 min
3.	Conclusion It is necessary because by doing this we can make the output of transducers compatible with the next stages.	5 min
4	Question / Answer Q1 What is signal conditioning? A1 To modify or improve the output signals (voltage or current) of various transducers. Q2 Tell the name of any signal conditioning device? A2 Op-amp	5 min

Assignment to be given: - NILReference Readings:-

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- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-12

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - D

S. No.	Topic :- Signal conditioning Devices (A.C. block diagram)	Time Allotted:-
1.	Introduction Signal conditioning devices are used in instrumentation systems to modify or improve the output signals (voltage or current) of various transducers. This is necessary so as to make them useful and compatible with next stages. In AC signal conditioning the excitation source used is AC.	5 min
2	Division of the Topic -Necessity of signal conditioning -AC signal conditioning	35 min
3.	Conclusion It is necessary because by doing this we can make the output of transducers compatible with the next stages.	5 min
4	Question / Answer Q1 What do you mean by AC signal conditioning? A1 In this the excitation source used is AC. Q2 Q2 Tell the name of any signal conditioning device? A2 Instrumentation amplifier	5 min

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Lecture Plan-13

Semester: - V

Class: - ECE I

Course Code: - EE-303 C

Subject: - Electronic Measurement and Instrumentation

Section: - D

S. No.	Topic :- Data Acquisition and conversion	Time Allotted:-
1.	Introduction A data acquisition system (DAQ) is a collection of sensors and communication links to sample or collect and then return data to a central location for further processing, display, or archiving. Data acquisition is the process of extracting, transforming, and transporting data from the source systems and external data sources to the host processing system to be displayed, analyzed, and stored. A data acquisition system may be used to obtain, and possibly record, information about an environment. Information obtained from the environment by the data acquisition system may be used to adjust a system operating in or controlling that environment. Digital data processing systems are employed in many applications, including a variety of laboratory process control, real time data analysis, and real time data reduction operations	5 min 35 min
2	Division of the Topic	
3.	Conclusion . A data acquisition system (DAQ) is a collection of sensors and communication links to sample or collect and then return data to a central location for further processing, display, or archiving	5 min
4	Question / Answer	5 min

Assignment to be given: - NIL

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Lecture Plan-14

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - A

S. No.	Topic :- Introduction of Oscilloscope	Time Allotted:-
1.	Introduction CRO is Cathode Ray Oscilloscope. It is generally used for display of various types of waveforms. These are of various types like storage oscilloscope etc.	5 min
2	Division of the Topic -CRO basics -Cathode Ray Tube	35 min
3.	Conclusion CRO helps in analyzing various signals by seeing their waveforms.	5 min
4	Question / Answer Q1 What do you mean by CRO? A1 Cathode Ray Oscilloscope Q2 What are the applications of CRO? A2 In display of various waveforms.	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-15

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - A

S. No.	Topic :- Block Diagram of Oscilloscope	Time Allotted:-
1.	Introduction CRO is Cathode Ray Oscilloscope. It is generally used for display of various types of waveforms. These are of various types like storage oscilloscope etc.	5 min
2	Division of the Topic -Block diagram of CRO -CRO applications	35 min
3.	Conclusion CRO helps in analyzing various signals by seeing their waveforms.	5 min
4	Question / Answer Q1 What is the main part of CRO? A1 CRT Q2 Which type of deflection is used in CRO? A2 Electrostatic deflection	5 min

Assignment to be given: - NILReference Readings:-

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Lecture Plan-16

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - A

S. No.	Topic :- Dual trace CRO	Time Allotted:-
1.	Introduction In this, there are two separate vertical input channels and these use separate attenuator and preamplifier stages. Therefore the amplitude of each input, can be individually controlled.	5 min
2	Division of the Topic -Introduction -Block Diagram	35 min
3.	Conclusion In this each channel can be individually controlled	5 min
4	Question / Answer Q1 In CRT where the focusing anode is located? A1 Between pre accelerating and accelerating anodes. Q2 What is the source of emission in CRT? A2 Barium and strontium oxide coated cathode	5 min

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Lecture Plan-17

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - A

S. No.	Topic :- Digital Storage Oscilloscope	Time Allotted:-
1.	Introduction This CRO consists of CRT which is cheaper. It is also capable of an infinite storage time using digital memory. It can operate with a constant CRT refresh time .	5 min
2	Division of the Topic <ul style="list-style-type: none">- Block diagram- Description of Block diagram- Applications- Advantages- Disadvantages	35 min
3.	Conclusion A digital storage oscilloscope is capable of infinite storage time.	5 min
4	Question / Answer Q. 1 What is special feature of this CRO ? Ans. It is capable of infinite storage time. Q. 2 State advantage of this CRO . Ans. CRT of this CRO is cheaper.	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Doc. No.: DCE/0/15

Revision: 00

Lecture Plan-18

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - A

S. No.	Topic :- Phase measurement with CRO	Time Allotted:-
1.	Introduction We apply two sinusoidal voltages at the CRO terminals and see the pattern generated at the CRO. If it is straight line then both are in phase, if it is circle then they are having 90 degree phase shift.	5 min
2	Division of the Topic -Phase measurement using CRO	35 min
3.	Conclusion Phase can be easily measured by using CRO. We apply two voltages at CRO and see the pattern generated and we can measure the phase.	5 min
4	Question / Answer Q1 Why aquadag is used in the CRO? A1 To collect the secondary emission electrons. Q2 What are the applications of CRO? A2 Frequency , phase, voltage, current measurement	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
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Lecture Plan-19

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - C

S. No.	Topic :- Signal Generator	Time Allotted:-
1.	Introduction These instruments generally produce a fixed frequency sine wave, whose output can be frequency or amplitude modulated. The instrument covers a frequency range of 0.001 Hz to 50 GHz.	5 min
2	Division of the Topic -Introduction to signal generator -Block diagram of signal generator	35 min
3.	Conclusion Sine wave can be generated by using signal generators.	5 min
4	Question / Answer Q1 How the signal generator works? A1 In this the energy is converted from a simple dc source into ac source at some specific frequency. Q2 How can we produce a triangular waveform? A2 By integrating a square wave.	5 min

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Revision: 00

Lecture Plan-20

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - C

S. No.	Topic :- Types of signal Generator	Time Allotted:-
1.	Introduction Signal generator can be classified as i) Heterodyne type ii) Swept frequency type iii) Random Noise type	5 min
2	Division of the Topic - Classification of Signal Generator - Block Diagram of Heterodyne SG - Swept frequency SG - Random Noise	35 min
3.	Conclusion Heterodyne signal generator can give continuously , wide frequency range output from a signal instrument.	5 min
4	Question / Answer Q. 1 What is function of heterodyne signal generator ? Ans. It the instrument producing wide frequency range.. Q. 2 What is special feature of swept frequency signal generator ? Ans . The output frequency is cyclically swept through a range of frequencies.	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
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Revision: 00

Lecture Plan-21

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - C

S. No.	Topic :- Function Generator Introduction	Time Allotted:-
1.	Introduction A function generator is a versatile instrument which produces a choice of different waveforms whose frequencies are adjustable over a wide range.	5 min
2	Division of the Topic -Introduction -Basic elements of function generator	35 min
3.	Conclusion This can be used for the production of sine, square, saw tooth and triangular waveforms whose frequencies are adjustable over a wide range.	5 min
4	Question / Answer Q1 What is a function generator? A1 This is used to produce a variety of waveforms. Q2 What are the desirable characteristics of a signal source? A2 Stable frequency, Distortion free etc.	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-22

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - C

S. No.	Topic :- Block Diagram of Function Generator	Time Allotted:-
1.	<p>Introduction</p> <p>Instrument which delivers choice of different waveforms whose frequencies are adjustable over a wide range. The most common are sine, triangular, square, sawtooth waves.</p>	5 min
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - Def. of Function Generator - Block Diagram - Types of waveforms & applications 	35 min
		+
3.	<p>Conclusion</p> <p>Function Generator give variety of waveforms e.g. sine, triangular, sawtooth etc.</p>	5 min
4	<p>Question / Answer</p> <p>Q. 1 What is function generator ? Ans. It is Instrument giving different types of waveforms. Q. 2 What are the different types of waveforms ? Ans. Sine wave, triangular, sawtooth and square.</p>	5 min

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Lecture Plan-23

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - C

S. No.	Topic :- Wave Analyzer	Time Allotted:-
1.	Introduction Instrument designed to measure relative amplitudes of single frequency components in a complex waveform. It acts as a frequency selective voltmeter which is tuned to a frequency of one signal while rejecting all other signal components.	5 min
2	Division of the Topic <ul style="list-style-type: none"> - Def. Wave Analyzer - Description of wave analyzer - Applications 	35 min
3.	Conclusion Wave Analyzer measures relative amplitudes of single frequency.	5 min
4	Question / Answer Q.1 What is wave analyzer ? Ans Instrument giving relative amplitude of frequency. Q. 2 What are the types of wave analyzer ? Ans. i) Frequency selective wave analyzer ii) Heterodyne	5 min

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- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-24

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - C

S. No.	Topic :- Spectrum & harmonic Distortion Analyzer	Time Allotted:-
1.	Introduction Nonlinear behavior of circuit elements introduces harmonics in the output waveform and the resultant distortion is often referred as harmonic distortion.	5 min
2	Division of the Topic -Harmonics in the signal -Total harmonic distortion -Block diagram of harmonic distortion analyzer	35 min
3.	Conclusion Harmonics can be measured by using harmonic analyzer.	5 min
4	Question / Answer Q1 What are harmonics? A1 Nonlinear behavior of circuit elements introduces harmonics in the output waveform and the resultant distortion is often referred as harmonic distortion. Q2 What is the formula for total harmonic distortion? A2 $THD = [\sum(\text{Harmonics})^2]^{1/2} / \text{Fundamental}$	5 min

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Lecture Plan-25

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - C

S. No.	Topic :- Harmonic Analyzer	Time Allotted:-
1.	Introduction For frequency measurement in megahertz range, a heterodyne wave analyzer is used. The i/p signal is fed through attenuator and amplifier and then mixed with crystal oscillator and after that it is applied to an indicating meter.	5 min
2	Division of the Topic -Block diagram of heterodyne wave analyzer	35 min
3.	Conclusion This is used for very high frequency measurement (in megahertz)	5 min
4	Question / Answer Q1 Why do we use heterodyne analyzer? A1 For very high frequency measurement. Q2 How can we obtain good frequency response? A2 By using frequency synthesizers.	5 min

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Doc. No.: DCE/0/15
Revision: 00

Lecture Plan-26

Semester: - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - B

S. No.	Topic :- Instrument for measurement of voltage and current & other circuit parameters	Time Allotted:-
1.	Introduction Analog voltmeters are instruments that measure voltage or voltage drop in a circuit. They display values on a dial, usually with a needle or moving pointer. Analog voltmeters are used to locate excessive resistance that may indicate an open circuit or ground. They are also used to identify low voltage or voltage drops that may indicate a poor connection. Analog voltmeters are connected in parallel with the circuit being tested so that the meter can tap a small amount of current.. An ammeter is a measuring instrument used to measure the flow of electric current in a circuit. Electric currents are measured in amperes. Modern ammeter designs are non-mechanical, or digital, and use an analog to digital converter to measure the voltage across the shunt resistor.	5 min 35 min
2	Division of the Topic	5 min
3.	Conclusion Analog voltmeters are instruments that measure voltage or voltage drop in a circuit. An ammeter is a measuring instrument used to measure the flow of electric current in a circuit	5 min
4	Question / Answer Q1 What are the advantages of RTD? A1 Good Accuracy, Linearity Q2 Which type of transducer is RTD? A2 Resistive	

Assignment to be given: - NIL

Reference Readings:-

- 3) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 4) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-27

Semester: - V

Class: - ECE I

Course Code: - EE-303 C

Subject: - Electronic Measurement and Instrumentation

Section: - B

S. No.	Topic :- Instrument for measurement of voltage and current & other circuit parameters	Time Allotted:-
1.	Introduction Analog voltmeters are instruments that measure voltage or voltage drop in a circuit. They display values on a dial, usually with a needle or moving pointer. Analog voltmeters are used to locate excessive resistance that may indicate an open circuit or ground. They are also used to identify low voltage or voltage drops that may indicate a poor connection. Analog voltmeters are connected in parallel with the circuit being tested so that the meter can tap a small amount of current.. An ammeter is a measuring instrument used to measure the flow of electric current in a circuit. Electric currents are measured in amperes. Modern ammeter designs are non-mechanical, or digital, and use an analog to digital converter to measure the voltage across the shunt resistor.	5 min 35 min
2	Division of the Topic	
3.	Conclusion Analog voltmeters are instruments that measure voltage or voltage drop in a circuit. An ammeter is a measuring instrument used to measure the flow of electric current in a circuit	5 min
4	Question / Answer Q1 What are the advantages of RTD? A1 Good Accuracy, Linearity Q2 Which type of transducer is RTD? A2 Resistive	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
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Lecture Plan-28Semester: - VClass: - ECE ICourse Code: - EE-303 FSubject: - Electronic Measurement and InstrumentationSection: - B

S. No.	Topic :- Q-Meter	Time Allotted:-
1.	<p>Introduction</p> <p>A Q meter is a piece of equipment used in the testing of radio frequency circuits. The Q meter has been largely replaced in professional laboratories by other types of impedance measuring device, though it is still in use among radio amateurs</p>	5 min
2	<p>Division of the Topic</p> <p>-Radio frequency -Impedance</p>	35 min
3.	<p>Conclusion</p> <p>A Q meter is a piece of equipment used in the testing of radio frequency circuits. The Q meter has been largely replaced in professional laboratories by other types of impedance measuring device, though it is still in use among radio amateurs</p>	5 min
4	<p>Question / Answer</p> <p>Q1 What are the advantages of RTD? A1 Good Accuracy, Linearity Q2 Which type of transducer is RTD? A2 Resistive</p>	5 min

Assignment to be given: - NILReference Readings:-

- 5) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 6) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-29Semester: - VClass: - ECE ICourse Code: - EE-303ESubject: - Electronic Measurement and InstrumentationSection: - B

S. No.	Topic :- R.F Power measurement	Time Allotted:-
1.	Introduction Radio frequency energy is essentially ac voltage except that the frequencies involved are much greater than those encountered in power distribution , audio- frequency amplifier or control system . Radio frequencies extend well into the GHz region.	5 min
2	Division of the Topic -R.F VOLTAGE -R.F Energy	35 min
3.	Conclusion Radio frequency energy is essentially ac voltage except that the frequencies involved are much greater than those encountered in power distribution , audio- frequency amplifier or control system . Radio frequencies extend well into the GHz region	5 min
4	Question / Answer Q1 What are the advantages of RTD? A1 Good Accuracy, Linearity Q2 Which type of transducer is RTD? A2 Resistive	5 min

Assignment to be given: - NILReference Readings:-

- 7) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 8) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-30

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - B

S. No.	Topic :- Digital Instruments	Time Allotted:-
1.	Introduction The digital instruments indicate the value of measured in the form of a decimal number. The digital meters work on the principle of Quantization.	5 min
2	Division of the Topic -Introduction to digital instruments -Advantages of digital instruments -Comparison of analog and digital instruments	35 min
3.	Conclusion Digital instruments have a lot of advantages over the analog instruments like better accuracy, good resolution, less power requirement, less cost etc.	5 min
4	Question / Answer Q1 Give an example of digital instrument. A1 Flip flop Q2 Give any one advantage of digital instrument over analog? A2 Good accuracy	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-31

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - B

S. No.	Topic :- Digital Millimeter	Time Allotted:-
1.	Introduction DMM is a versatile instrument which is used in electronic measurement. It can measure dc voltage and current, ohms, ac voltage.	5 min
2	Division of the Topic -Introduction to DMM -Block diagram of DMM -Applications of DMM	35 min
3.	Conclusion This is used for the electronic measurement purpose and is very useful in electronic.	5 min
4	Question / Answer Q1 What can we measure with the help of DMM? A1 We can measure dc voltage and current, ohms, ac voltage. Q2 How do we measure resistance with the help of DMM? A2 Resistance can be measured by passing a known current through unknown resistance.	5 min

Assignment to be given: - NILReference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-32

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - C

S. No.	Topic :- Time measurement	Time Allotted:-
1.	Introduction In this measurement, the electronic counter used as an output readout device performs the function of an electronic stop watch i.e. it measures the time interval.	5 min
2	Division of the Topic -Introduction to Time interval measurement] -Block diagram Universal counter meter for time interval measurement	35 min
3.	Conclusion The Electronic counter timer are used as an output readout device performs the function of electronic stop watch.	5 min
4	Question / Answer Q. 1 Which the device measuring time interval ? Ans. Universal counter timer. Q. 2 electronic counter performs which function ? Ans. Stop watch.	5 min

Assignment to be given: - NIL

Reference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Lecture Plan-33

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and InstrumentationSection: - C

S. No.	Topic :- Frequency Measurement	Time Allotted:-
1.	<p>Introduction Frequency measurement is possible with the help of Digital frequency meter.</p> <p>The signal whose frequency is to be measured is converted into train of pulses , one frequency pulse for each pulse of the cycle.</p>	5 min
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - Frequency measurement types - Digital frequency meter - Description of digital frequency meter. 	35 min
3.	<p>Conclusion The frequency to be measured is converted into number of pulse train. & then counted by electronic counter.</p>	5 min
4	<p>Question / Answer</p> <p>Q. 1 Which is the instrument for frequency measurement ? Ans. Digital frequency meter.</p> <p>Q. 2 What is done for frequency measurement ? The unknown frequency is converted into number of pulses.</p>	5 min

Assignment to be given: - NILReference Readings:-

- 1) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 2) Electronics Instrumentation and Measurement Techniques by Cooper

Doc. No.: DCE/0/15

Revision: 00

Lecture Plan-34

Semester - V

Class: - ECE I

Course Code: - EE-303 F

Subject: - Electronic Measurement and Instrumentation

Section: - C

S. No.	Topic :- Universal Counter	Time Allotted:-
1.	Introduction . a universal counter comprises a pair of flip-flops and a pair of logic gates arranged to provide any of a plurality of counting or timing measurements. A gate control circuit includes a control logic Section to provide routing and synchronization of digital signals from several inputs, including an internal source as well as a pair of external sources, into one or both of a pair of count chains.	5 min
2	Division of the Topic -Counter -Memory Section -	35 min
3.	Conclusion A universal counter comprises a pair of flip-flops and a pair of logic gates arranged to provide any of a plurality of counting or timing measurements	5 min
4	Question / Answer Q. 1 Which is the instrument for frequency measurement ? Ans. Digital frequency meter. Q. 2 What is done for frequency measurement ? The unknown frequency is converted into number of pulses.	5 min

Assignment to be given: - NIL

Reference Readings:-

- 3) A course in Electrical and Electronics Measurement & Instrumentation by A.K.Sawhney
- 4) Electronics Instrumentation and Measurement Techniques by Cooper