KNT107 - MEASUREMENT TECHNIQUES - Meslek Yüksekokulu - Elektronik ve Otomasyon Bölümü

General Info

Objectives of the Course

Course aims to enable students to make accurate measurements by understanding the units of measurement used in electrical and electronic circuits, measurement methods, and the causes of measurement errors. The course aims to determine the values of circuit elements such as resistors, inductors, and capacitors, and to perform alternating and direct current measurements, as well as current, voltage, and frequency measurements. Students will also learn the structure, use, and calibration of measuring instruments such as multimeters and oscilloscopes, acquiring the ability to measure DC and AC voltage, period, frequency, square waves, and pulsed signals. Furthermore, the structure and operating principles of instrument transformers, as well as power and energy measurements, will be covered, providing students with a comprehensive understanding of both theoretical and applied measurement techniques.

Course Contents

Reading resistances, examining capacitors and coils, analyzing semiconductor elements, using measuring instruments, performing continuity tests with voltage, current, frequency and resistance measurements, checking the integrity of semiconductors, using the oscilloscope and applying direct current and alternating current voltage measurements, period and frequency measurements with the oscilloscope.

Recommended or Required Reading

Electrical and Electronic Measurements (Prof. Dr. Halit Pastacı), AA and DC measuring instruments, Multimeter, Measurement Transformer, Oscilloscope.

Planned Learning Activities and Teaching Methods

Face to face

Presentation Of Course

Face to Face

Dersi Veren Öğretim Elemanları

Inst. Samet Ayık

Program Outcomes

1. Learn units of measurement and their conversions.
2. Learns physical quantities and their measurement.
3. Learn the meaning of measurement and measurement errors.
4. Learn to calculate measurement errors.
5. Learns measuring instruments and the symbols on them.
6. Learns resistor color codes. Can measure resistance and coil values on the circuit.
7. Learn how to measure capacitors and RLC.
8. Learn how to measure direct and alternating current.
9. Learn how to measure current, voltage and frequency.
10. Learn to measure circuit elements and parameters.
11. Learns the use of multimeters.
12. Learn the structure of the oscilloscope, its operating principles, the use of its probes and its calibration.
13. Learn how to measure direct and alternating current, voltage, period and frequency, square wave, and pulsed signals with an oscilloscope.
14. Learn the structure, operating principle and use of instrument transformers and explain power and energy measurements.

Weekly Contents

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
1	Review of basic mathematical operations and unit conversions Source Page: 1-3		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Units of Measurement and Conversions	Conversion of units of measurement
2	Preliminary study of basic physical quantities Source Page: 1-3		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Physical Quantities and Their Measurement	Practical measurements of physical quantities
3	Preliminary reading about the concept of measurement and types of errors Source Page: 22-23		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	The Concept of Measurement and Causes of Measurement Errors	Experimental demonstration of measurement errors
4	Study on measurement error calculation methods Source Page: 22-27		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Calculation of Measurement Errors	Application for calculating measurement errors
5	Examining the types of measuring instruments and their intended uses Source Page: 47-48		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Measuring Instruments and Their Symbols	Examining the symbols on measuring instruments

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
6	Preliminary work to learn the definitions and properties of resistors, coils and capacitors Source page: 204-231		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Resistor Color Codes and Measurement of Circuit Elements	Reading resistor color codes and circuit measurements
7	Preliminary study of the basic theory of RLC circuits Source Page: 204-231		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Capacitor and RLC Measurements	Measuring capacitor and RLC circuits
8	Midterm exam		Midterm exam	Midterm exam	Midterm exam
9	Repetition of DC and AC current concepts Source Page: 80-175		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Measurement Methods in Direct Current and Alternating Current	Voltage and current measurement in AC and DC circuits
10	Review of the concepts of voltage, current and frequency Source Page: 80-175		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Current, Voltage and Frequency Measurement Techniques	Frequency measurement and parameter analysis
11	Preliminary study on the parameters of basic circuit elements Source Page: 204-231		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Measuring Parameters of Circuit Elements	Practical measurements of circuit elements
12	Examining multimeter types and user manuals Source Page: 388-431		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Structure and Use of Multimeters	Multimeter usage and applications
13	Preliminary study of the basic functions and operating principles of the oscilloscope Source Page: 293-340		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Structure, Working Principle and Calibration of the Oscilloscope	Oscilloscope connection, probe use and calibration practices
14	Examining basic signals such as sine, square, and triangle waves Source Page: 293-340		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	AC/DC Voltage, Period and Frequency Measurements with Oscilloscope	Signal measurement applications with oscilloscope
15	Preliminary study on the operating logic of power, energy and transformers Source Page: 177-202		Face to face, subject explanation by following the course source and then problem solutions to reinforce the relevant subject.	Structure, Working Principle and Power-Energy Measurement of Instrument Transformers	Power and energy measurements, instrument transformer applications

Workload

Activities	Number	PLEASE SELECT TWO DISTINCT LANGUAGES
Vize	1	1,00
Ödev	14	3,00
Final	1	1,00
Derse Katılım	14	3,00
Ara Sınav Hazırlık	1	1,00
Final Sınavı Hazırlık	1	1,00
Uygulama / Pratik	14	1,00
Kısa Sınav	2	2,00
Sözlü	2	2,00
Diğer	10	1,00

Assesments

Activities	Weight (%)
Ara Sınav	40,00
Final	60,00

Elektronik ve Otomasyon Bölümü / KONTROL VE OTOMASYON TEKNOLOJİSİ PROGRAMI X Learning Outcome Relation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11	P.O. 12	P.O. 13	P.O. 14
L.O. 1	5				3									
L.O. 2	5				4									
L.O. 3	4				4									
L.O. 4	4				5									
L.O. 5	5										4			
L.O. 6	4										3			3
L.O. 7	4										4			
L.O. 8	4										5			
L.O. 9	4										5			
L.O. 10	4										5			
L.O. 11	4										4			
L.O. 12	4										5			4
L.O. 13	4										5			4
L.O. 14	5										5			4

Table :

P.O. 1 : Mesleği ile ilgili temel, güncel ve uygulamalı bilgilere sahip olur.

P.O. 2 : İş sağlığı ve güvenliği, çevre bilinci ve kalite süreçleri hakkında bilgi sahibi olur.

P.O. 3 : Mesleği için güncel gelişmeleri ve uygulamaları takip eder, etkin şekilde kullanır.

P.O. 4 : Mesleği ile ilgili bilişim teknolojilerini (yazılım, program, animasyon vb.) etkin kullanır

P.O. 5 : Mesleki problemleri ve konuları bağımsız olarak analitik ve eleştirel bir yaklaşımla değerlendirme ve çözüm önerisini sunabilme becerisine sahiptir.

P.O. 6 : Bilgi ve beceriler düzeyinde düşüncelerini yazılı ve sözlü iletişim yolu ile etkin biçimde sunabilir, anlaşılır biçimde ifade eder.

P.O. 7 : Alanı ile ilgili uygulamalarda karşılaşılan ve öngörülemeyen karmaşık sorunları çözmek için ekip üyesi olarak sorumluluk alır

P.O. 8 : Kariyer yönetimi ve yaşam boyu öğrenme konularında farkındalığa sahiptir.

P.O. 9 : Alanı ile ilgili verilerin toplanması, uygulanması ve sonuçlarının duyurulması aşamalarında toplumsal, bilimsel, kültürel ve etik değerlere sahiptir.

P.O. 10 : Bir yabancı dili kullanarak alanındaki bilgileri takip eder ve meslektaşları ile iletişim kurar.

P.O. 11 : Kontrol ve otomasyon sistemlerinin temel prensiplerini açıklar, tasarımını ve montajını yapar.

P.O. 12 : Otomasyon sistemlerinde meydana gelebilecek arızaları tespit eder ve arızaları giderir.

P.O. 13 : PLC, mikrodenetleyici ve diğer kontrol sistemleri için yazılım geliştirir.

P.O. 14 : Endüstriyel sensörler ve kontrol elemanları hakkında bilgi sahibi olur ve uygulamalar geliştirir.

L.O. 1 : Ölçü birimlerini ve dönüşümlerini öğrenir.

L.O. 2 : Fiziksel büyüklükleri ve ölçülmesini öğrenir.

L.O. 3 : Ölçmenin anlamını ve ölçme hatalarını öğrenir.

L.O. 4 : Ölçme hatalarının hesaplanmasını öğrenir.

L.O. 5 : Ölçü aletlerini ve ölçü aletleri üzerinde yer alan sembolleri öğrenir.

L.O. 6 : Direnç renk kodlarını öğrenir. Devre üzerinde direnç değeri ve bobin değeri ölçebilir.

L.O. 7 : Kondansatör ve RLC ölçümünü öğrenir.

L.O. 8 : Doğru ve Alternatif akımda nasıl ölçüm yapıldığını öğrenir.

L.O. 9 : Akım, Gerilim ve Frekans Ölçümünün nasıl yapıldığını öğrenir.

L.O. 10 : Devre elemanlarının ve parametrelerinin ölçümünü öğrenir.

L.O. 11 : Multimetrelerin kullanımını öğrenir.

L.O. 12 : Osiloskopun yapısını, çalışma ilkelerini, proplarının kullanımını ve kalibrasyonunu öğrenir.

L.O. 13 : Osiloskop ile doğru ve alternatif akım, gerilim, periyot ve frekans, kare dalga, darbeli işaret ölçümlerini öğrenir.

L.O. 14 : Ölçü trafolarının yapısını, çalışma prensibini, kullanımını öğrenir ve güç ve enerji ölçümlerini açıklayabilir.