

TITLE Theoretical Foundations of Electrical Engineering

ECTS CREDITS 12

DEPARTMENT of Metrology and Data-Measuring Technologies

DESCRIPTION

Module 1. Theory of steady-state modes in linear electric circuits.

Basic peculiarities and calculation methods of single phase linear electric circuits driven by harmonic vibrations sources.

Module 2. Basic characteristics and calculation methods of inductively coupled circuits.

Basic features and calculation methods of poly-phase harmonic circuits. Periodical non-sinusoidal voltages and currents in linear circuits.

Module 3. Transient analysis in linear circuits with lumped parameters.

Module 4. Non-linear electric circuits under DC and AC.

Transient in non-linear electric circuits.

Module 5. Theory of two-port circuits.

Reactive electrical filters.

Steady-state and transient in circuits with distributed parameters.

Module 6. Electrostatic fields in dielectric mediums.

Electrostatic fields in conducting mediums.

Magnetic field of DC.

Alternating electromagnetic field in stationary medium.

Study-unit Aims: Creation of adequate mathematical models of electromagnetic phenomena, an experimental study of the peculiarities of electromagnetic phenomena that correspond to the essential aspects of the physical processes and feature electromagnetic processes' calculation.

Learning Outcomes:

1. Knowledge & Understanding

By the end of the study unit the student will be able to:

- Explain the principles of electric DC circuit, single-phase, three-phase with the harmonic and polyharmonic power sources in stationary and transient conditions.

- Understand the peculiarities of nonlinear circuits under direct and alternating currents in steady-state and transient conditions.

- Explain the principles of calculating the parameters of the electric and magnetic fields.

2. Skills: By the end of study-unit the student will be able to:

- Perform calculations in circuits under DC, single-phase, three-phase currents, having harmonic and polyharmonic power sources in stationary and transient conditions.

- Determine the parameters of the electric and magnetic fields.

Texts and any supplementary readings:

Alexander C. Fundamentals of Electric Circuits. McGraw-Hill Companies. 2013/ 995 p.

Lorrain P. Electromagnetic Fields and Waves Including Electric circuits. W.H. Freeman and Company. New York. 1988. 383 p.

TITLE Fundamentals of Metrology and Electrical Measurements

ECTS CREDITS 3

DEPARTMENT of Metrology and Data-Measuring Technologies

DESCRIPTION

Module 1. Fundamentals of Metrology.

Metrology and electrical measurements.

Погрешности электрических измерений.

Errors of electrical measurements.

Processing of measurement results.

Means of electric measurement engineering.

Module 2 . Electric Measurement .

Measurements of lumped parameter in electrical DC and AC circuits.

Measurement of AC and DC power supply.

Measurement of power, energy, power factor and power quality.

Measuring parameters of semiconductor devices.

Measurement of magnetic field.

Study-unit Aims: Forming of knowledge on the basics of metrology, the study of methods of measurement, principles of construction electrical measuring instrument.

Learning Outcomes:

1.Knowledge & Understanding

By the end of the study unit the student will be able to:

- Explain basic metrological characteristics of measurement tools.
- Understand the measurement methods.
- Explain the principles of construction of the characteristics of measurement tools..

2.Skills: By the end of study-unit the student will be able to:

- choose the method of measurement.
- Select the devices for the measurement.
- Assess the measurement error.

Texts and any supplementary readings:

Malaric R. Instrumentation and Measurement in Electrical Engineering.
BrownWalker Press. Boca Raton, Florida. USA. 2011. 253 p.