**Control questions for course “Electricity and magnetism”**

1. Define the flux of a vector field.
2. What surface is called the equipotential surface?
3. Define the principle of superposition for electric potential.
4. Does the electric field of uniformly charged infinite plate depend from the distance to the plate?
5. Announce the polarisation mechanisms of dielectrics.
6. What is called the gradient of a vector field?
7. What quantities determine the resistance of a conductor? In what units are measured the specific resistance of a conductor?
8. Formulate the first Kirchhoff’s law and give its mathematical expression.
9. What phenomenon is called the self-induction?
10. What magnitude has the module of the impedance of a series resonance contour at resonance frequency?
11. What vectors are used as characteristics of magnetic field?
12. Draw the field lines of magnetic field if the steady current is flowing from the plane of figure to you.
13. What force is acting in the magnetic field on a moving charged particle? Give the corresponding mathematical formula.
14. Formulate the Faraday law of electromagnetic induction.
15. What is the difference between circularly and linearly polarised waves?
16. Number of turns of primary winding of ideal transformer is *n1* and that of secondary winding – *n*2. What is the ratio of currents of primary and secondary windings?
17. What it is a gyromagnetic ratio?
18. Write the expression of a plane electromagnetic wave and explain the quantities contained in it.
19. Define the circulation of a vector field.
20. Give the definition of electromotive force.
21. Draw the field lines of point charge.
22. What is the electric field between two infinite parallel plates uniformly charged with charges of opposite sign?
23. What energy has a conducting body charged to potential φ? Give the formula.
24. What is the relationship between vectors of electric displacement, electric field strength and polarisation?
25. What is a divergence of a vector field? Is it a vector or scalar quantity?
26. What is the frequency dependence of an active resistance? Draw it.
27. What states the second Kirchhoff’s law? Give the corresponding mathematical formula.
28. Give the formula for electromotive force of mutual induction.

1. What is the interaction of two parallel conducting wires if the steady currents in them flow in opposite directions?
2. What force is acting on a moving charged particle in a space where simultaneously exist both the electric and the magnetic fields?
3. Formulate Lentz’s law in case of electromagnetic induction.
4. What wave is a transversal wave?
5. What it is an ideal electrical transformer?
6. The diamagnetic body is placed in the external magnetic field. What will be the magnetic field inside the body?
7. What is a capacitance of a conducting body?
8. Formulate the superposition principle for electric field strength?
9. Which field diminishes faster with distance that of point charge or that of elementary dipole?
10. What is the relationship between the electric field strength and the potential?
11. Where the electric field is weaker in vacuum or in dielectric?
12. Write the Ohm’s law for a homogenous part of conductor in an integral form.
13. Give the formula connecting the circulation of magnetic field along the contour which encloses several wires carrying current.
14. What can you say about the magnitude of impedance of parallel connection of RLC at resonance frequency?
15. What is a magnetic dipole? How it behaves in a magnetic field?
16. Waves are classified as transversal and longitudinal. To which group belong electromagnetic waves?
17. What force in a magnetic field acts on a conductor with length *l* carrying current *I*? Give the corresponding formula.
18. What phenomenon is called the electromagnetic induction?
19. In what units measure the mutual induction and the self-induction in SI system?
20. Number of turns of primary winding of ideal transformer is *n1* and that of secondary winding – *n*2. What is ratio of voltages of primary and secondary windings?
21. How substances are classified according their magnetic properties?
22. Suppose there are no free charges and conduction currents in a space. Can there be nonzero electromagnetic field?
23. What equals the circulation of electrostatic field along the closed contour?
24. Formulate the Gauss theorem for electrostatic field in a substance.
25. Draw the field lines of elementary electric dipole.
26. How sounds the Ohm’s law for a closed circuit? Give the corresponding formula.
27. What is the relationship between the field strength and the potential difference of parallel plate capacitor?
28. Draw the hysteresis loop of a ferroelectric.
29. Write the expression of Laplace operator.
30. What is the frequency dependence of a capacitive resistance? Draw it.
31. What is the relationship between current and current density?
32. What phenomenon is called the mutual induction?
33. What is the source of a stationary magnetic field?
34. Which quantities determine the magnetic field strength in toroid shape and solenoid shape coils?
35. What deflection system of electron beam is used in Cathode Ray Tube monitors?
36. Why the cores of electrical transformers are put together from thin plates covered by oxide?
37. What is the relationship between vectors of magnetic induction, magnetic field strength and magnetisation?
38. What it is a interference of waves?
39. To what quantity is proportional the energy of electrostatic field?
40. What does it mean the homogenous vector field?
41. What it is del or nabla operator?
42. Why ferromagnetic materials can be used as memories for information storage?
43. Write the Ohm’s law for homogenous part of conductor in differential form.
44. What are the material relationships in case of linear isotropic media? Write them.
45. What it is a stationary magnetic field?
46. Write the Thomson formula for the electrical oscillation contour.
47. What kinds of losses are present in a real electrical transformer?
48. Formulate the Gauss theorem for magnetic field and give its mathematical formula.
49. What is the physical explanation of the phenomenon of electromagnetic induction?
50. What is ferromagnetic domain?
51. What phenomenon is called a diffraction of waves? How can be explained the diffraction of electromagnetic waves?
52. What it is a wave front?
53. What is a curl of a vector field?
54. What is the frequency dependence of inductive resistance? Draw it.
55. What are lines of a vector field?