NATIONAL TECHNICAL UNIVERSITY
«KHARKIV POLYTECHNICAL INSTITUTE»

List of questions to prepare for the exam

Specialty 141 - Electric power, electrical engineering and electromechanics
Educational program Electric power industry
Academic discipline Exploitation and operating modes of power plants electrical equipment
Semester 8

1. Formulate the law of conservation of energy.
2. Formulate the law of electromagnetic induction.
3. Write down the equations for determining active power, reactive power and full power. Why do we need active and reactive power?
4. What are the losses in electric machines and transformers? In what form do they stand out?
5. Why are the cores of transformers and electric machines recruited from thin plates of electrical steel?
6. Why transformers studied in the course of electric machines? What is it «transformer»?
7. What are the main elements of the transformer? How does a transformer work?
8. What experiments (tests) conducted for the determination of rated parameters of transformers?
9. State the principle of reversibility of electric machines. In what modes can electric machines work?
10. What are AC machines? What are the main parts they consist of?
11. Describe ways to deal with the harmonics of the currents number 5 and number 7 in the AC machines.
12. What are the design rotors of asynchronous machines?
13. Describe ways to deal with the higher harmonics of the currents in the AC machines.
14. Why the windings of the AC machines stators made distributed and shortened?
15. Describe the design of the stators and rotors of AC machines.
16. What problems haves the induction motor when starting up?
17. In what modes can asynchronous machines work? Indicate the areas of asynchronous machines use in these modes.
18. In what modes can asynchronous machines work? Indicate the areas of asynchronous machines use in these modes.
19. What types of windings can be shortened? Why shorten the stator windings of AC machines?
20. How can you improve the startup characteristic of an asynchronous motor with short-circuited rotor?
21. Describe the principle of a synchronous generator operation.
22. Describe the design of the explicit pole rotor of synchronous machine.
23. Describe the design of the implicit pole rotor of synchronous machine.
24. Describe how a synchronous machine works in motor mode.
25. Describe the cooling systems of turbogenerators.

26. What is the anchor reaction in synchronous generators? What determines the direction of the flux of the reaction anchor created by the stator current?

27. What is the main difference between rotors of asynchronous and synchronous machines? Why can't asynchronous machines work in synchronous mode?

28. Describe the design of DC machines.

29. Compare the speed characteristics of DC motors with different schemes field windings.

30. Describe the design of DC machines main poles. Why the main poles needed?

31. State the advantages and disadvantages of DC machines. What drives are they used in?

32. In what modes can electrical equipment operate at a power plant?

33. What methods of reactive power compensation in the power system and in the workshops of industrial enterprises do you know?

34. How is the power supply backed up for auxiliary power receivers at nuclear power plants?

35. What are auxiliary power receivers at nuclear power plants? Give examples.

36. Why do they use not one three-phase block transformer, but three single-phase ones, for generators of nuclear power plant blocks?

37. What is self-starting of engines on power plant units? What are the problems with this, and how to protect the equipment from self-starting problems?

38. Describe the stages of starting a powerful turbogenerator after repair.

39. Describe the stages of braking of a powerful turbogenerator.

40. What types of excitation systems are there for synchronous generators at power plants?

Approved at a meeting of the department «Electric stations»
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