

AE1B14SP1 – Electric Machines

Topics for Exam

Transformers

1. Draw the equivalent circuit and write down the basic equations of a transformer.
2. Explain the term vector group (hour angle) of a transformer.
3. What are the conditions for parallel operation of loaded transformers?
4. What types of operation must be avoided for current and voltage instrument transformers?
5. How does the transient current of a transformer depend on the instant of connection to the sinusoidal voltage supply?

Induction Machines

6. Draw the equivalent circuit and write down the basic equations of an induction machine.
7. What types of losses arise in an induction machine?
8. Draw a typical torque-speed characteristic of an induction machine. What parameters influence its shape and how?
9. What are the methods to start an induction machine?
10. What is the circle diagram of an induction machine? How do we construct it and what can we learn from it?
11. Draw a typical torque-speed characteristic of a single-phase induction machine. What are the main methods to start it?

Synchronous Machines

12. What are the main types of synchronous machines?
13. What are the V-curves of synchronous machines?
14. What is used to control active and reactive powers of a generator connected to the power grid?
15. What is the main difference between torque characteristics of synchronous machines with salient and non-salient rotor poles?
16. How does static stability of a synchronous machine changes with the load angle?
17. What are the conditions for synchronization of a generator?
18. What are the common excitation systems of synchronous generators?
19. What is the principle of operation of a brushless DC machine?

DC Machines

20. Describe the principle of DC machines.
21. What are the main types of DC machines and their properties?
22. Draw the main characteristics of separately excited DC machine.
23. What is the armature reaction? What does it cause and what approach is used in order to minimize its negative effects?
24. Write down the basic equations of a DC machine.
25. How is speed of DC-machines controlled? What is “field weakening”?