

Department of Electrical and Electronics Engineering

Subject: Computer Aided Electrical Machine Design

Subject Code: EE-314-F

1. Classify the electrical machine based on their construction point of view .
2. What are the principle involved in electric machine design?
3. Limitation of the machine design?
4. Explain the cooling methods of the machine
5. Write a short notes on conduction , radiation and convection.
6. What are the types of enclosures and what is the importance of the enclosures in machine design?
7. Write general ratings of the electrical machine design.
8. Why the ventilation required to the machine
9. Explain the output coefficient of the electrical machine?
10. Explain the electrical loading and magnetic loading of the machine?
11. Derive an expression s for temperature rise , heating and heat dissipation for electrical machine while finalizing the design.
12. General features of electrical machines.
13. A fan rated 3.75kw blows $240 \text{ m}^3/\text{min}$ of air through a 750kN motor to carry away heat, If the inlet temperature is 22°C and outlet temp is 31°C estimate the losses in motor.
14. What is the use of heat sinks in Electrical Machines?
15. What is Magnetic and electric Loading ?
16. Compare the leakage flux and leakage reactance
17. Write a short notes on conduction , radiation and convection.
18. What are the types of enclosures and what is the importance of the enclosures in machine design?
19. What are the factor those effect the size of rotating machines? Why the machine with large dimension are more efficient?. Compare the leakage flux and leakage reactance. What are the principle involved in electric machine design? What are limitation of the machine.
20. What is Magnetic loading and electric loading and specific loading?
21. What do you mean by the term of optimization.
22. Write short notes on design of field magnet.
23. Difference between power transformer and distribution transformer.
24. Write a short notes on conduction , radiation and convection.

25. Determine the diameter and length of the armature core for a 55kW, 110V, 1000rpm, and 4pole dc shunt generator. Assume: Specific magnetic loading 0.5T, Specific electric loading 13000 ampere –turns, Pole arc 70% of pole pitch and length of core about 1.1 times the pole arc, Allow 10A for field current and a voltage drop of 4V for the armature circuit. Determine also the number of armature conductors and slots.
26. If one hour rotating machine is root 3 times the continuous rating and if steady temperature rise for one hour rating is twice that on normal load. Find the ratio of iron to copper losses at full load?
27. Obtain the following design information for the stator of a 30 kW, 440 V, 3 Φ , 6 pole, 50Hz delta connected, squirrel cage induction motor, (i) Main dimension of the stator, (ii) No. of turns/phase (iii) No. of stator slots, (iv) No. of conductors per slot. Assume suitable values for the missing design data.
28. A large reel of paper installed at the end of a paper machine has diameter 1.8 m, a length of 5.6m, and a moment of inertia of 4500kg.m². It is driven by a directly coupled variable speed dc motor turning at 120 r/min. The paper is kept under a constant tension of 6000N. Calculate (i) the power of motor when the turns at a constant speed of 120 r/min. (ii). If the speed has be raised from 120 r/min to 160 r/min in 5 second, calculate the torque that motor must developed during the interval. (iii). Power of motor after it has reached the designed speed of 160 r/ min.
29. For a preliminary design of a 50hp, 230V, 1400 rpm dc motor, calculate the armature diameter and core length, number of poles and peripheral speed. Assume specific magnetic loading 0.5T, specific electric loading 25000 ampere-conductors per meter, efficiency 0.9.
30. Obtain the following design information for the stator of a 30 kW, 440 V, 3 Φ , 6 pole, 50Hz delta connected, synchronous motor (i) Main dimension of the stator, (ii) No. of turns/phase .
31. What is the use of heat sinks in electrical machines and Why the ventilation required to the machine and list out the types of the ventilation in Electrical Machines.
32. What are the types of enclosures and explain the closed type of enclosure? What is the importance of enclosures.
33. Explain the design details of the Induction Motor ?
34. Calculate the armature diameter and core length for a 7.5kW, 4pole, 1000rpm, and 220V shunt motor. Assume: Full load efficiency = 0.83, field current is 2.5% of rated current. The maximum efficiency occurs at full load.
35. Explain the design details of the Synchronous Motor ?
36. Determine the main dimensions of a 350kVA, 3 phase, 50Hz, Star/delta, 11000 / 3300 V core type distribution transformer. Assume distance between core centres is twice the width of the core.
37. Define the window space factor of transformer?
38. What is pulsation losses in electric machine.
39. Which type of brushes are used in dc machine.
40. What is the role of commutator in dc machine ?
41. What are the insulations are required in machine design.
42. Why all modern dc motor have silicon steel core yokes?
43. Write general ratings of the electrical machine design and explain each one.
44. Derive the output equation of single phase and three phase transformer?
45. Write the different types of losses in machine and explain it.

46. Calculate the no-load current of a 220/110V, 1kVA, 50Hz, Single phase transformer with the following data uniform cross-sectional area of the core= 25cm^2 , effective magnetic core length= 0.4m, core weight = 8 kg, maximum flux density = 1.2 T, magnetizing force = 200 AT/m, specific core loss = 1.0 W/kg?
47. Following design data have been obtained during the preliminary design of a 3 phase, 850 kW, 6.6 kV, 50 Hz, 12 pole slip ring induction motor. Gross length of stator core = 45 cm, internal diameter of the stator core = 122 cm, number of stator slots = 144, Number of conductors per slot = 10. For the above stator data design a wound rotor for the motor.
48. Derive an expression for temperature rise, heating and heat dissipation for electrical machine while finalizing the design.
49. A fan rated 3.75kW blows $240\text{ m}^3/\text{min}$ of air through a 750kN motor to carries away heat, If the inlet temperature is 22°C and outlet temp is 31°C estimate the losses in motor.
50. Write short notes on conducting, insulating and magnetic materials.
51. Explain the details design of the Induction Motor ?
52. Explain construction of dc motor armature and commutator.
53. A 300 watt dc motor has a full load efficiency of 60 per cent calculate the power developed by the armature at full load if the sum of iron friction and windage losses is $1/3$ of total losses.
54. Determine the main dimensions of the armature core, number of conductors, and commutator segments for a 350kW, 500V, 450 rpm, 6pole shunt generator assuming a square pole face with pole arc 70% of the pole pitch. Assume the mean flux density to be 0.7T and ampere conductors per cm to be 280.