
B.E. DEGREE EXAMINATION, Nov-Dec – 2011
VI SEMESTER
ELECTRICAL AND ELECTRONICS ENGINEERING
EE384 DESIGN OF ELECTRICAL APPARATUS

Time: 3 Hours **Max. Marks: 100**

Answer all questions

PART- A (10 X 2 = 20)

1. List the three major considerations to be considered to evolve a good design.
2. Explain the significance of the ratio $r = \varphi_m/AT$ in the design of transformer.
3. Write the output equation of a DC machine.
4. What is the significance of the length of the air gap of in Induction motor design?
5. Why do we use starter for motors?
6. How does the number of slots affect the induction motor design?
7. Define voltage regulation of alternator.
8. State the difference between power transformer and Distribution transformer.
9. Why is it very important to calculate the accurate value of leakage reactance of an Induction motor?
10. What do you mean by inrush currents?

PART- B (5 X 16 = 80)

11. The tank of a 1250 kVA transformer has the dimensions, 1.55m x 0.65m x 1.85m in length, width and height respectively. The full load loss is 15 kW. Find the number of tubes for temperature rise of 40° C. Assume all other data.

12. (a) Explain the design procedure of a field coil of a DC machine. What are the assumptions to be made in that?

(OR)

12. (b) (i) Explain the step by step procedure of designing the commutator of a DC machine.

(ii) What are the commutator losses and also explain the check for the temperature limit for the commutator.

13. (a) Calculate the approximate overall dimensions for a 250 kVA, 6600/440 V, 50 Hz, 3 phase core type transformer. Assume the following data.
Emf/turn = 11 V, B_m = 1.25 Wb/m^2, ∂ = 2.5 A/mm^2, K_w = 0.33, , a = 0.9d, & Ai= 0.6d^2; Overall Height = Overall Width, Stacking factor = 0.9

(OR)

13. (b) (i) Derive the emf equation of a single phase transformer.

(ii) Derive the output equations of single phase transformer.

14. (a) Determine the main dimensions of the stator and the number of slots for a 6 hp, 6 pole, 50 Hz, 415 V, and 3 phase induction motor. $B_m = 0.55$ Wb/m^2 and q = 260 ac/cm. Full load efficiency and power factor are 0.85 & 0.88 respectively. Assume the core length to be equal to the pole pitch.

(OR)

14. (b) Determine the dimensions of the core , number of conductors and slots for a 3 phase, 300 kVA, 3000 V, 50 Hz, 1000 rpm star connected alternator , assuming the mean flux density over a pole pitch to be 0.5 Wb/m^2 and the approximate number of ac/cm of air gap periphery to be 250. State the assumptions made.

15. (a) Explain the principles of finite difference and finite element methods in electrical machine design problems.

(OR)

15. (b) Explain computer aided design of electrical apparatus with a neat flow chart.

***