



FACULTY OF ENGINEERING
B.E. 4/4 (E and EE) I Semester (Main) Examination, December 2010
ELECTRIC MACHINE DESIGN

Time : 3 Hours]

[Max. Marks : 75

Note : Answer all questions from Part A. Answer any five questions from Part B.



(25 Marks)

1. Compare copper and aluminium conducting materials. 3
2. Give the classification of magnetic materials according to their relative permeability. 2
3. What is meant by magnetic leakage ? 2
4. Define heating firm constant with necessary equation. 3
5. What are the factors should be considered when selecting value for armature diameter of a D.C. machine ? 3
6. Define specific magnetic loading. 2
7. What is meant by SCR of synchronous machine ? 3
8. What are the two functions of transformer oil ? 2
9. What are the advantages of digital computers for design the electrical machines ? 2
10. Draw flow chart for a analysis method of computer aided design. 3

PART – B

(50 Marks)

11. a) Explain CRGO steel in detail. 5
- b) Give the classification and explain the insulating materials in relation to their thermal stability. 5
12. A 230 V, 15 K.W., 4 pole d.c. machine has the following data :
 Armature diameter = 0.25 m
 Armature core length = 0.125m;
 Length of air gap at pole centre = 2.5 mm;
 Flux per pole = 11.7×10^{-3} wb.

$$\text{Ratio } \frac{\text{Pole are}}{\text{Pole Pitch}} = 0.66 .$$

Calculate the mmf required for airgap :

- i) If the armature surface is treated as smooth
- ii) If armature is slotted and gap contraction factor is 1.18.

10



13. a) Explain induced and forced ventilations with neat diagram. 5
b) Explain the following types of duties for rotating machines. 5
i) Intermittent periodic duty.
ii) Continuous duty with starting and braking.
14. Explain tentative design of field winding of a d.c. machine with all necessary expressions. 10
15. a) Explain synthesis method of computer aided design with neat flow chart. 5
b) Explain the general procedure for optimization of electrical machines. 5
16. Calculate the main dimensions of a 100 kVA, 2000/400 V, 50 Hz single phase shell type transformer. 10
Volt per turn = 10 V
Flux density of core = 1.1 wb/m^2
current density = 1.2 s/mm^2 .
window space factor = 0.33.
The ratio of window height to window width and ratio of core depth to width of central limb = 2.5
The stacking factor = 0.9.
17. Write short notes on the following :
a) Length of airgap influences the performance of synchronous machine.
b) Super conductivity
c) Carter's co-efficient.