

FACULTY OF ENGINEERING**B.E. 4/4 (E&EE) I – Semester (Main) Examination, Nov. / Dec. 2012****Subject : Electric Machine Design****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

1. Mention the properties of ideal insulating materials. (3)
2. Give the classification of magnetic materials according to their relative permeability. (2)
3. Write short notes on armature leakage. (3)
4. Why cooling is required for electrical machines? (2)
5. Why is the power factor poor for an induction motor when the machine is designed with a high specific magnetic loading. (3)
6. What is meant by stacking factor? (2)
7. Explain the general procedure for optimization of electrical machines. (3)
8. What are the advantages of computer aided design of electrical machines? (2)
9. Define SCR and significance of SCR in synchronous machine. (3)
10. Differentiate magnetic circuit and electric circuit. (2)

PART – B (50 Marks)

- 11.a) Explain the various alloys of copper used in electrical apparatus and machines. (5)
- b) Explain and distinguish between materials used for rheostat and heating devices with examples. (5)
12. The temperature rise of a transformer is 25°C after one hour and 37.5°C after 2 hours of starting from cold conditions. Calculate its final steady temperature rise and the heating time constant if its temperature falls from the final steady value to 40°C in 2.5 hours when disconnected. Calculate its cooling time constant. The ambient temperature is 30°C . (10)
- 13.a) Derive the output equation of a D.C. machine from basis. (5)
- b) Explain the factors to be considered for selection of number of poles in D.C. machines. (5)

14. A 250 KVA, 6600 Volt/400 Volt, 3 phase core type transformer has a total loss of 4800 W at full load. The transformer tank is 1.25m in height and 1m x 0.5m in plan. Design suitable scheme of tubes, if average temp raise is to be limited to 35°C . The diameter of tube is 50mm and spaced 75 mm from each other and average height of tube is 1.0m. The specific heat dissipation due to radiation and convection is respectively 6 and $6.5 \text{ W/m}^2 - ^{\circ}\text{C}$. Assume convection is improved 35% due to provision of tubes. (10)
15. Explain in detail the computer aided design of a electrical machine with the help of flow charts by using any two approaches. (10)
- 16.a) Derive the expression for relation between real and apparent flux densities. (5)
- b) Explain the specific electric and magnetic loadings of rotating machines and derive the related expressions. (5)
17. Write short notes on the following : (10)
- a) Super conductors
 - b) Carter's coefficient
 - c) Rating of electrical machines
