

Duration – 3 Hours

Total Marks - 80

- Note:- (1) Question No.1 is compulsory.
 (2) Attempt any three questions out of the remaining five questions.
 (3) Assume suitable data if necessary and justify the same.

- Q 1. Answer the following questions. 20M
- a) Classify different insulating materials based on temperature. 5M
 - b) Write about choice of flux density for designing of a transformer. 5M
 - c) Explain effect of dispersion coefficient on maximum power factor. 5M
 - d) Write a short note on design of EV grade induction motor. 5M
- Q 2 a) Derive the output equation of 3 phase transformer. 10M
- Q 2 b) Determine the overall dimensions of a 200KVA, 6600/400V, 50Hz, 1 phase, core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage/turn=14V, maximum flux density = 1.1 wb/m^2 , current density = 3 A/mm^2 , Window space factor = 0.32, stacking factor=0.9. For a cruciform core, width of largest stamping = $0.85d$ and Net iron area = $0.56 d^2$ where d is the diameter of circumscribing circle. 10M
- Q 3 a) Derive the output equation for 3 phase Induction motor. 10M
- Q 3 b) Determine the main dimensions and total no of conductors for minimum cost design, for a 3.7KW, 400V, 1410 rpm, 3ph, 4 pole, 50Hz, delta connected squirrel cage IM with the data: average flux density in air gap = 0.45 wb/m^2 , ampere conductor = 23000A/m, efficiency= 0.85, pf= 0.84, winding factor= 0.955, current density= 3.5 A/mm^2 , stacking factor= 0.9, slot space factor= 0.4 10M
- Q 4 a) What are the factors considered when estimating the length of air gap? Explain it in detail 5M
- Q 4 b) What are the rules for selecting rotor slots in induction motor? 5M
- Q 4 c) Write a short note on Short Circuit Ratio (SCR). What is the effect of SCR on machine performance 10M
- Q 5 a) How would you determine the full load field mmf in synchronous machine? 10M
- Q 5 b) Determine the suitable stator dimensions for a 1000 KVA, 50Hz, 3 phase alternator to run at 375 rpm. Take mean gap density over the pole pitch as 0.55 Wb/m^2 , the specific electric loading as 25000 A/m. Assume winding factor=0.955. The peripheral speed should not exceed 35m/s. 10M
- Q 6 a) What are the limitations of traditional machine design? Explain analysis method of computer aided design. 10M
- Q 6 b) Write a short note on methods of cooling of Transformer? 10M
