Q.P. Code: 25420

Duration : - Three Hours **Total Marks:- 80**

NOTE
1. Question No 1 is Compulsory.
2. Solve any three out of the remaining.
3. Figure to the right side indicates marks.
4. Assume the suitable data and mention the same if required.

Q1. Answer the following questions.

a. What are the fundamental requirements of high electrical conductivity materials? **[5]**
b. Define Dispersion Coefficient? Explain effect of it on maximum power factor. **[5]**
c. What are the different types of enclosures used in three phase Induction Motor? State the purpose **[5]**
d. Discuss the factors affecting the choice of flux density for designing of transformer. **[5]**

Q2. a. Explain the design of insulation in transformer. **[10]**

Q2. b. Derive an output equation of single phase and three phase transformer. **[10]**

Q3. a. Discuss designing of cooling tubes and tank in a transformer. **[10]**

Q3 b. Estimate the main core dimensions for a 50Hz, 3-ph, 200 KVA, 6600/500 volts, star/delta core type transformer. Use the following data: core limb section to be 4-stepped for which the area factor (Ai) = $0.62d^2$; Window space factor = 0.27, Height of window = 2 times width of window, Current density = 2.8 A/mm^2, Voltage per turn = 8.5V, Maximum flux density =1.25Wb/m^2. **[10]**

Q4.a. Discuss the various mechanical forces developed in transformer with sketches. Explain how they are taken care while fabrication. **[10]**

Q4. b. Calculate the no load current of a 400V, 50 Hz single phase core type transformer, the particulars of which are as follows, length of mean magnetic path 200cm; gross core section area 100 cm^2 ; joints equivalent to 0.1mm air gap; maximum flux density 0.7 Wb/m^2; specific core loss at 50Hz and 0.7 Wb/m^2 is 0.5 watts per Kg; ampere turns 2.2 per cm for 0.7 Wb/m^2; stacking factor 0.9; density of core material 7.5×10^3 kg/m^3 **[10]**

Q5.a. Derive the output equation of a three phase Induction Motor in terms of main dimensions. **[10]**

Q5 b. Calculate 1] diameter 2] length 3] number of turns per phase 4] full load current and cross-section of conductor, and 5]total I^2R loss of stator of 3 phase, 120 KW, 2200 volts, 50 Hz, 750 rpm (synchronous speed), star connected induction motor from the following particulars; Bav = 0.48Wb/m^2 , ac = 26000 Amp conductor per meter, efficiency=92%, pf =0.88, L=1.25τ, winding factor 0.955, current density = 5A/mm^2, mean length of stator conductors =75cm, ρ= 0.021 ohm per m and mm^2 section. **[10]**

Q6 a. Discuss the Concept of Carters Coefficient in detail. **[10]**

Q6 b. Explain various types of leakage fluxes in Induction Motor with neat diagram. **[10]**