Total No. of Questions : 8]

SEAT No. :

P2950

[Total No. of Pages : 2

[5669]-539

T.E. (Electrical)

DESIGN OF ELECTRICAL MACHINES

(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Derive the output equation for a three phase core type transformer. **[6]**

b) Explain the different modes of heat dissipation. **[6]**

c) Explain the mechanical forces developed under short circuit conditions. Also state the measures to overcome this effect. **[8]**

OR

Q2) a) Explain any three types of windings used in a transformer. **[6]**

b) Explain the procedure to calculate the no load current in case of a three phase transformer. **[6]**

c) Explain the procedure for the design of tank with tubes and derive the relation for the number of tubes. **[8]**

Q3) a) Define specific electrical and magnetic loadings. Explain the factors to be considered for the choice of specific electrical loading and specific magnetic loading. **[8]**

b) Derive the Output equation for three phase induction motor with usual notations. **[8]**

OR

Q4) a) Explain the design of any two types of AC windings. **[8]**

b) Explain the various factors in detail which play a major role while deciding the number of stator slots. **[8]**

Q5) a) What are the suitable combinations of designing stator and rotor slots? **[8]**

b) Derive the equation for end ring current for the rotor of squirrel cage induction motor. **[8]**

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OR

Q6) a) Explain the various factors which affect the length of air gap in an induction motor. **[8]**

b) A 11 KW, 220 v ,3phase ,6 pole , star connected squirrel cage induction motor has the following data : number of stator slots = 54,number of conductor in each stator slot = 9, number of rotor bars = 64, efficiency = 0.86, power factor = 0.85,current density = 5A/mm^2. Find bar current , end ring current , area of bar , area of end ring . Assume Rotor mmf as 85% of Stator mmf. Assume suitable data if required. **[8]**

Q7) a) Explain **[6]**

i) Slot leakage

ii) Tooth top leakage

iii) Zig-zag leakage

iv) Overhang leakage with the help of necessary diagrams.

b) Explain the effects of ducts on calculation of magnetizing current. **[6]**

c) A 75KW, 3300v, 50 Hz, 8 pole, 3 phase , star connected induction motor has a magnetizing current which is 40% of full load current. Calculate the value of stator turns per phase if the mmf required for flux density at 60° from the pole axis is 500A. winding factor 0.95 , efficiency = 0.94 and power factor =0.86. Assume suitable data if required. **[6]**

OR

Q8) a) Explain the MMF Calculation for air gap, stator teeth, stator core, rotor teeth and rotor core. **[6]**

b) Explain how the no load current is calculated in case of induction motor. **[6]**

c) Calculate the magnetizing current for 415 V, 3phase, 50 Hz, 4 pole induction motor which has the following dimensions: air gap length is 0.5mm; flux density at 60° is 0.478 wb/m^2. The stator winding is delta connected with 4 slots / pole / phase and 28 conductors / slot. The ampere turns for the iron path is equal to 45% of the air gap ampere turns. Assume the gap contraction factor as 1.2, stator winding factor =0.955. Assume suitable data if required. **[6]**

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