Total No. of Questions : 4]

SEAT No. :

PB116

[Total No. of Pages : 2

[6269]-330

T.E. (Electrical Engineering) (Insem)

COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES

(2019 Pattern) (Semester - II) (303149)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat figures must be drawn wherever necessary.***
5) ***Use of non-programmable calculator is permitted.***

Q1) a) List the heat dissipating modes. Explain with justification by which mode most of heat is dissipating? **[5]**

b) In the design of the transformer if L.V. winding is placed away from the core what are disadvantages of the same. **[4]**

c) Explain the functions of transformer auxiliaries: **[6]**

i) Tap changer,

ii) Pressure release valve, and

iii) Breather and conservator

OR

Q2) a) With usual notations, derive the equation for temperature rise - time characteristics for electrical machines. **[5]**

b) Explain the effect of selecting higher value of B_m than the normal value in the overall design of the transformers. **[4]**

c) A field winding has heat dissipating surface of 15m^2 and length of mean turn of 1 m. It dissipates loss of 150 W, the emissivity being 34 W/m^2-ºC. Calculate the final steady temperature rise of the coil and its time constant if the cross section of the coil is 100 × 50 mm^2. Specific heat of copper is 390 J/kg-ºC. The space factor is 0.56. Copper weighs 8900 kg/m^3. **[6]**

P.T.O.

Q3) a) Derive the equation for voltage per turn $E_t = K \sqrt{Q}$ **[4]**

b) Explain the design of core of transformers to determine the overall dimensions of core (width and height of the magnetic frame) three phase core type transformer. **[4]**

c) Estimate the main dimensions including winding conductor areas of a three phase delta-star core type transformer rated at 300 kVA, 6600/440 V, 50 Hz,. A suitable core of three steps having a circumscribing circle of 0.25 m diameter and leg spacing of 0.4 m is available. The emf per turn is 8.5 V. Assume a current density of 2.5 A/mm^2, a window space factor of 0.28 and stacking factor of 0.9. **[7]**

OR

Q4) a) Derive the expression for the determination of number of cooling tubes in the transformers. **[4]**

b) Design the windings for three phase, 100 kVA, 11000/433 V, 50 Hz, Delta/Star connected, tappings at ± 2.5% and ± 5% on HV winding distribution transformer. Assume suitable current density. **[4]**

c) Determine the main dimensions of the core of three phase 350 kVA, 11000/3300 V, Star-Delta, 50 Hz, core type transformer. Assume: Voltage per turn = 11, Maximum flux density = 1.25 Wb/m^2,Net cross section of core = 0.6 d^2, Window space factor = 0.27, Window proportion = 3:1, current density = 250 A/cm^2. **[7]**