PA-10047

[6009]-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) *Solve Q.1 or Q.2, Q.3 or Q.4.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable additional data, if necessary.*
5) *Use of non-programmable calculator is allowed.*

Q1) a) State and Explain the different modes of heat dissipation. **[6]**

b) Write various specifications of a transformer as per IS 2026 part - I. **[4]**

c) A field coil has a dissipating surface of $0.15m^2$ & a length of mean of 1m. It dissipates loss of 150 watts, the emissivity being 34 watts/m^2. °c. Estimate the final steady temperature rise of the coil its and its time constant if the cross section of the coil is 100×50 mm^2, Specific heat of copper is 390 J/kg. °c. The space factor 0.56. copper weighs $8900kg/m^3$. **[5]**

OR

Q2) a) Derive the expression for heating curve with usual notations and hence define heating time constant. **[6]**

b) Write the functions of Tap changer, pressure release valve, conservator and breather? **[4]**

c) What are different types of winding used in a transformer? Explain any two. **[5]**
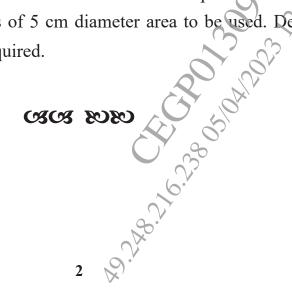
P.T.O.

Q3) a) Derive the output equation of a three phase transformer with usual notation. **[5]**

b) Explain the procedure for the design on tank with cooling tubes and derive the relation for the number of cooling tubes. **[4]**

c) A 200 KVA, 6600/400V, three phase transformer, delta/star connected, 50 Hz, core type transformer has the following particulars: Maximum flux density = 1.3 wb/m², current density = 2.5A/mm², window space factor = 0.3, Overall height = overall width and use three stepped core, stacking Factor = 0.9, emf per turn = 10 volts. Width of largest stamping = 0.9d and net iron area = 0.6d² Calculate overall core dimensions. **[6]**

OR

Q4) a) Derive the relation (A_i / area of circumscribing circle) and (A_{gi} / area of circumscribing circle) for square core **[4]**

b) Derive expression for the condition of transformer design for minimum cost in terms of total cost of iron and copper cost for three phase transformer. **[5]**

c) Design a suitable cooling tank with cooling tubes for a 500 kVA, 6600/440V, 50Hz, 3 phase transformer with the following data. Dimensions of the transformer are 100 cm height, 96 cm length and 47 cm breadth. Total losses = 7 kw. Allowable temperature rise for the tank walls is 35°c. tubes of 5 cm diameter area to be used. Determine the number of tubes required. **[6]**

ಚಿಚ ಜಿಜಿ