

Total No. of Questions : 8]

SEAT No. :

**P751**

[5870] - 1055

[Total No. of Pages : 2

**T.E. (Electrical)**

**COMPUTERAIDED DESIGN OF ELECTRICAL MACHINES**

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

*Time: 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagram must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the procedure to estimate the no load current of three phase transformer. [6]
- b) Calculate the percentage regulation at full load 0.8pf lag for a 300kVA, 6600/440v, delta-star, 3 phase, 50Hz, core type transformer having cylindrical coils of equal length with the following data. Height of coils=4.7 cm, thickness of HV coil=1.6 cm, thickness of LV coil=2.5 cm, insulation between LV&HV coils=1.4 cm, Mean diameter of the coils=27 cm, volt/turns=7.9 V, full load copper loss=3.75Kw [8]
- c) State & explain the measures to overcome the mechanical forces under short circuit conditions [4]

OR

- Q2)** a) Discuss mechanical forces developed under short circuit condition in a transformer. [6]
- b) Draw and explain generalized flow chart for design of transformer. [6]
- c) State the assumptions made while calculating leakage reactance of transformer. [6]
- Q3)** a) Discuss the various factors to be considered for selection specific magnetic loading ( $B_{av}$ ) and specific electric loading ( $a_c$ ). [10]
- b) What are the various types of AC windings for three phase induction motor? Explain in brief any two. [7]

OR

- Q4)** a) Derive the output equation of a 3 phase induction motor in terms of its specific loadings. Also indicate the significance of terms involved. [7]
- b) Estimate the main dimensions for 3 $\phi$ , 50Hz, 10kW, 400V, 4 pole squirrel cage induction motor. Assume full load efficiency of 0.85, full load power factor of 0.9 and winding factor 0.96. The specific magnetic loading is 0.6 wb/m<sup>2</sup> and the specific electric loading=22000A/m. Take rotor peripheral speed as 25 m/s at synchronous speed. [10]

**P.T.O.**

**Q5) a)** Explain the factors should be considered when estimating the length of air gap of three phase induction motor. Why the air gaps should be as Small as possible? [10]

**b)** Discuss the design of wound rotor w.r.t the following [8]

- i) no. of rotor slots
- ii) no.of rotor turns
- iii) area of rotor conductors
- iv) rotor windings.

OR

**Q6) a)** Discuss the various factors which decide selection of number of stator slots in case of 3 phase induction motor [8]

**b)** A 15KW, 3 $\phi$ , 50Hz, 400V, 4 pole, star connected squirrel cage induction motor has 60 slots, each containing 7 conductors. The rotor slot's are 50. Assume full load efficiency as 0.85 full load Power factor as 0.9 and rotor mmf is 80% of stator mmf. Calculate the value of bar and end ring current. Also find the area of each bar and each end ring, if current density is 5A/mm<sup>2</sup> [10]

**Q7) a)** Derive the equation for No Load Current of 3 $\phi$  induction motor. [10]

**b)** Draw and explain generalized flow chart for design of three phase induction motor. [7]

OR

**Q8) a)** State and explain with neat sketches different types of leakage fluxes in an induction motor and estimate slot leakage reactance in an induction motor. [10]

**b)** Explain the effect of ducts on the calculation of magnetizing current of 3 $\phi$  induction motor. [7]

