

MATEL

- N. B. : (1) Attempt five questions, Q. No. 1 is compulsory.
 (2) Figures to the right indicate full marks.
 (3) Group the answers for each question.
 (4) Assume suitable data wherever required.

B. (27/11/20) VII Old Principles of Electrical Design 20

1. Attempt any four :—
 - (a) What is the role of conservator and breather in case of a transformer ?
 - (b) Explain duty cycle for an electrical motor. How motor rating depends on duty cycle.
 - (c) What are the types of leakage reactances in 3 phase induction motor ?
 - (d) What is harmonic torque ? State two methods to reduce harmonic torques ?
 - (e) Explain the significance of B_{60° in estimating the magnetizing current in a 3 ϕ induction motor.

2. (a) Discuss different accessories and their functions used for transformer. 10
 (b) Discuss in detail the different methods of cooling of a transformer. 10

3. (a) Explain the method of calculating the magnetising Ampere turns for a tapered tooth. Discuss, how to find out the Ampere turns of all the teeth under one pole. 10
 (b) Derive an expression for reluctance offered by a parallel sided slot with single conductor in a induction motor stator. 10

4. (a) Explain current distribution in the bars and end rings of a squirrel cage induction motor using neat diagram. 10
 (b) What is overload capacity of an Induction motor ? Comment on the choice of various design parameters on its overload capacity. 10

5. (a) Write in detail in different types of winding used in a transformer. 10
 (b) A transformer is connected to 230 V/50 Hz input to deliver 50 V/3A output. If turns per volts is 4, flux density is 1.2 Wb/m² for square cross section and current density is 2.2 A/mm², find number of primary and secondary turns, window space required and the window dimensions for a single phase transformer. 10

6. (a) Discuss in detail the mechanical forces developed in case of a transformer. 10
 (b) Derive and discuss the dispersion coefficient of a 3 phase induction motor in terms of length air gap, number of poles and stator bore diameter. 10

7. Write short notes on any three :— 20
 - (a) Different types of insulation used in transformer
 - (b) Construction of core of a transformer using CRGO steel
 - (c) Different types of coils used and their applications in a transformer
 - (d) Prove the exponential law between time and temperature rise at a constant load for electrical equipment
 - (e) Find the expression for maximum power factor in terms of dispersion coefficient for a 3 phase induction motor.