

(2 Hours)

Total Marks - 60

i) Question No. 1 is compulsory.

ii) Attempt any three questions from remaining.

iii) Assume suitable data (mention the same) wherever necessary.

iv) Figures to the right indicate full marks.

Q.1 Attempt any **Three**

- A) Explain the necessity of a starter in a DC motor. [5]
- B) Obtain the conditions for maximum efficiency of a single-phase transformer. [5]
- C) Briefly explain the methods to minimize harmonics in a three-phase transformer. [5]
- D) Why is single-phase induction motor not self-starting? [5]
- E) Briefly explain the speed control of 3 phase induction motor using V/f method. [5]

Q.2 A) Explain (i) armature-torque Vs armature-current and (ii) armature-speed Vs armature-current characteristics of DC shunt motor. [8]

Q.2 B) Explain back-to-back (Sumpner's) test on single-phase transformers. [7]

Q.3 A) A 500V DC shunt motor takes 4 A on no load. The armature resistance and field resistance are 0.2Ω and 500Ω , respectively. Estimate the losses and efficiency of the motor when input line current is 100 A. [8]

Q.3 B) Explain the working of shaded pole single phase induction motor. [7]

Q.4 A) Explain the Scott (T-Connection) connection used in transformer for the phase conversion. [7]

Q.4 B) A 6 pole, 50 Hz, 3 Phase, induction motor runs on full load develops a useful torque of 150 N-m, at rotor frequency of 1.5 Hz. Calculate the shaft power output. With the mechanical torque lost in friction be 10 N-m. Determine rotor copper losses, the input to the motor and efficiency. [8]

Q.5 A) Explain the speed-torque characteristic of 3-phase induction motor. [8]

Q.5 B) Describe the auto-transformer starter for three phase induction motor. [7]

Q.6 Write short notes (**Any three**)

- A) Commutation in DC machines [5]
- B) Harmonics in three phase transformers [5]
- C) Power stages in 3 Phase induction motor [5]
- D) Circle diagram [5]