(3 Hours)   [Total Marks : 80]

Instructions: Question No: 1 is compulsory.
                  Answer any three from the remaining six questions.

Q. 1   Marks
                                                                         20
  (a) Define inrush current in three phase transformer   05
  (b) Explain the Dd0 phasor group of three phase transformer connection 05
       alongwith connection diagram and phasor diagram
  (c) Name the different methods of starting of single phase induction motor and 05
       explain any one
  (d) Explain the working principle of three phase induction motor   05

Q.2   20
  (a) A three phase , star connected , 400V, 50Hz, 4 pole induction motor has the 10
       following per phase constants in ohm referred to stator
       R_1=0.15, X_1=0.45, R_2=0.12, X_2=0.45, X_m=28.5
       Fixed losses (core and friction and windage losses)= 400 w. compute stator
       current , rotor speed , output torque and efficiency when motor is operated at
       rated voltage and frequency at a slip of 4%
  (b) Explain star-delta starter for a 3 phase induction motor. Derive the 10
       expression for starting current and starting torque.

Q.3   20
  (a) Explain the necessity of controlling voltage anlong with frequency for speed 10
       control of an induction motor for v/f control method. Also draw torque-speed
       characteristic for constant v/f ratio at different frequencies.
  (b) Explain double field revolving theory for a single phase induction motor. 10

Q.4   20
  (a) Two three phase transformers reated at 500 KVA and 450 KVA respectively 10
       are connected in parallel to supply a load of 1000 KVA at 0.8 p.f. lagging.
       The per phase leakage resistance and reactance of the first transformer is
       2.5% and 6% respectively and of second transformer 1.6% and 7%
       respectively. Calculate the KVA load and p.f. at which each transformer
       operates.
  (b) Conditions required for successful parallel operation of three phase 10
       transformers

Q.5   20
  (a) Draw & explain torque-speed characteristics of 3 phase induction motor at
       variable rotor resistance.
  (b) "Induction motor takes 30 to 40% for rated current at no load" justify the
       statement.

Q.6   Write a short note on (any two)   20
  (a) Excitation phenomenon in 3 phase transformer
  (b) Oscillating neutral
  (c) Double cage induction motor

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