

(3 Hours)

Total Marks: 80

N.B: (1) Question No. 1 is compulsory.

(2) Attempt any three from the remaining questions.

(3) Figures to the right indicate full marks.

(4) Each question is of 20 Marks.

Q1. Answer ANY FOUR.

- a) List down the conditions to be fulfilled for successful parallel operation of transformers. **05**
- b) Explain torque speed characteristics of an induction motor. **05**
- c) Whether a single phase induction motor is self-starting, justify your answer. **05**
- d) With neat diagrams explain Dd6 and Dy1 connections. **05**
- e) Derive relation between starting torque and full load torque for three phase Induction motor. **05**

Q 2

- a) Two three phase transformers connected in parallel supply a load requiring an active power of 700 kW and lagging reactive power of 715 kVAR. Transformer 1 is rated at 400 KVA and has p.u. impedance of $(0.03 + j0.08)$ while transformer 2 is rated at 600 KVA and has p.u. impedance of $(0.02 + j0.07)$. Determine active power shared by each transformer and operating power factor. **10**
- b) Write a short note on 'Saving of Copper in an Auto-transformer'. **10**

Q 3

- a) Explain various power stages in an induction motor with necessary expressions. **10**
- b) A 3 phase; 4 pole; 1440 rpm; 50 Hz induction motor has a star connected rotor with per phase rotor resistance and standstill reactance as 0.2Ω and 1Ω respectively. When the stator is energised with rated supply voltage at rated frequency the rotor induced e.m.f. between lines is 210V. Calculate, rotor current; power factor and torque at standstill and at full load. **10**

Q 4

- a) Write a short note on 'Open Delta' connection of three phase transformer. **10**
- c) An 8 pole 50 Hz, three phase induction motor runs at a speed of 720 rpm when delivering full load torque. Its rotor resistance and stand still reactance are 0.1Ω and 0.6Ω per phase respectively. An additional resistance of 0.5Ω per phase is inserted in the rotor circuit to control the speed. Calculate the speed at which the motor will run now if full load torque remains same. **10**

Q 5

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- a) A 220 V, 4 pole, 50 Hz split phase induction motor has following test results: **10**

Blocked rotor test:	120 V	9.6 Amp.	460 Watts
No load test:	220 V	4.6 Amp.	125 Watts

The stator winding resistance is 1.5Ω and during the blocked rotor test, the starting winding is open. Determine the equivalent circuit parameters. Also find core, friction and windage losses.

- b) Explain i) capacitor start & capacitor run and ii) shaded pole induction motor with neat diagrams. **10**

Q 6 Write short note on ANY TWO of the following.

- a) Deep bar and double cage induction motor. **10**
 b) Oscillating neutral phenomenon in transformer. **10**
 c) Scott connection. **10**