

Time: 3 Hours

Total marks : 80

Note: 1) Question No.1 is compulsory.

2) Attempt any three questions out of remaining five question.

3) Assume suitable data if required.

1. Solve any four each carry equal marks. 20
 - a) Define and explain inrush current in 3 phase transformer.
 - b) Explain the operating principle of three phase induction motor.
 - c) Name the different methods of starting of 1-phase Induction motor and explain any one.
 - d) Explain need of parallel operations of transformers and write necessary condition for parallel operation.
 - e) Draw and explain torque slip characteristics of 3 phase I.M.
- 2)a. Describe in brief connection and phasor diagram of various phasor groups in 3-phase transformer. 10
 - b. Two three phase transformers rated at 500 KVA and 450 KVA respectively and connected in parallel to supply a load of 1000 KVA at 0.8 PF 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 PF at which each transformer operates. 10
- 3.a Explain different speed control methods of 3-phase induction motor. 10
 - b. An 18.65 KW, 4 pole, 50 Hz, 3-phase induction motor has friction and windage losses of 2.5% of the output. The full load slip is 4%. Find for full load (i) Rotor copper loss (ii) Rotor input (iii) Shaft torque. 10
4. a. Explain the need of starter for 3 phase I.M. and explain auto-transformer starter in detail. 10
 - b. A 14.9KW , 400V , 4pole , 50Hz 3 phase star connected I.M. give the following test result

	Line current(A)	Power i/p (w)	Line voltage(v)
N.L. test	9	1250	400
Blocked rotor test	38	4000	150

Assume stator and rotor ohmic losses are equal at standstill. Draw circle diagram and find line current , power factor , slip , and efficiency at F.L. 10
5. a . Draw equivalent circuit diagram of single phase I.M. based on double field revolving theory and explain the double field revolving theory. 10
 - b. Explain shaded pole 1 phase I.M. in detail. 10

6. Write short note on any two

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- a. Scott connection of two 3 phase transformers.
- b. Induction generator.
- c. Mechanical forces in 3-phase transformer.

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