

QP Code : 1652

(3 Hours)

[ Total Marks : 100

- N.B. : (1) Question no. 1 is **compulsory**  
 (2) Attempt **any four** questions from the remaining **six** questions.  
 (3) Assume suitable data if necessary and justify the same.

1. (a) Explain the effect of oscillating neutral in 3- $\phi$  transformer. 5  
 (b) Enlist the types of 1- $\phi$  Induction motors and their applications. 5  
 (c) Why 1- $\phi$  induction motor is not self starting? Draw its torque-slip characteristics. 5  
 (d) Why the induction motor is called as a poor power factor machine? Also explain why it is called as a generalised transformer? 5
2. (a) Explain cogging and crawling in 3-- $\phi$  transformer. 10  
 (b) Explain how 3- $\phi$  phase supply can be converted to 2-- $\phi$  supply using transformer. 10
3. (a) Explain the methods of starting in 3 - $\phi$  Induction motor. 10  
 (b) A 1500kVA, 1.1/6.6 kV, 3- $\phi$  star /delta connected transformer has following test results: SC test(instruments are placed on the HV side): 300V, 131.21A, 30kW  
 Calculate its % resistance and reactance drops, % regulation and efficiency on full load at 0.8 pflagging .The iron loss during OC test is 25kW. 10
4. (a) Describe in brief connection and phasor diagram of various vector groups along with their applications in 3- $\phi$  transformer. 10  
 (b) Explain whether it is possible to change the direction of rotation in shaded pole type induction motor? Justify. 10
5. (a) Derive Equivalent circuit diagram of 3- $\phi$  induction motor . 10  
 (b) Two 3- $\phi$  delta/star connected-transformers having same no load line voltage ratio 3300V/400V supply a load of 700kVA at 0.8 pf lagging while operating in parallel. The rating of one of the transformer is 450kVA, its resistance is 2% and reactance is 3%. The corresponding values of the other transformer are 250kVA with resistance and reactance of 1.5% and 4% respectively . Calculate load supplied by each transformer, pf at which each transformer is working and secondary line voltage of the circuit. 10

- 6 (a) Explain methods of speed control of 3- $\phi$  squirrel cage Induction motor. Which method is the efficient method and why? 10
- (b) A 15kW, 440V, 4 pole 50Hz, 3- $\phi$ , star connected induction motor gave following test results 10

	Line voltage	Line current	Power input
No load test	440V	10A	1310W
Blocked rotor test	200V	50A	7100 W

Assume stator and rotor ohmic losses equal at standstill. Draw the circle diagram.

7. Write short note on (any TWO) 20
- (i) Double field revolving theory
  - (ii) Effect of inrush current on performance of transformer,
  - (iii) Explain the mechanical forces in transformer.

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