

13. a) Transform the stationary circuit variables of 3ϕ RL circuit to arbitrary reference frame. 13,K2,CO3

OR

- b) Discuss briefly about static and rotating reference frame. 13 K2,CO3

14. a) Analyze the steady state operation of induction machine in detail. 13,K2,CO4

OR

- b) Explain the computer simulation of three phase induction machine in arbitrary reference frame. 13,K2,CO4

15. a) For a 2-pole, 3-phase, Y-connected, salient-pole synchronous machine, derive the voltage equations in machine variables and in arbitrary reference- frame variables. 13 K2,CO5

OR

- b) Derive the expression for electromagnetic torque of a synchronous machine in abc variables. 13,K2,CO5

PART - C (1 × 15 = 15 Marks)

16. a) Two coupled coils have self and mutual inductance of 15,K3,CO1
 $L_{11}=2+1/2x$; $L_{22}=1+1/2x$; $L_{12}=L_{21}=1/2x$;
Over a certain range of linear displacement. The first coil is excited by a constant current of 20A and the second by a constant current of -10 A. Find the mechanical work done and electrical energy supplied by each electrical source if x changes from 0.5m to 1m.

OR

- b) A steel ring has a mean diameter of 20 cm, cross sectional area of 25 cm^2 and a radial air-gap of 0.8 mm cut across it. When excited by a current of 1 A through a coil of 1000 turns wound on the ring core, it produces an air-gap flux of 1 mWb. Neglecting leakage and fringing, Calculate; 15,K3,CO1
A) Relative permeability of steel
B) Total reluctance of the magnetic circuit