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M.Tech. (EE)(2018 Batch) (Sem.–2)

DYNAMICS OF ELECTRICAL MACHINES

Subject Code : MTEE-203C-18

M.Code : 76104

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

1. State the assumptions made in developing the voltage and flux equations of a 3 phase symmetrical induction machine with regard to

   a. Space harmonics of the stator and rotor magnetic flux

   b. Winding resistance and reactance

   Justify mathematically that mutual inductance does not depend on rotor position in common reference frame concept.

2. Write down the assumptions for deriving the torque and emf equations of rotating electrical machines. What do negative sign in the torque expression signify?

3. Draw Kron's primitive machine. Give its constructional features. Draw its two axis model and develop the voltage equations.

4. Develop the dynamic equivalent circuits for synchronous machine. Obtain the transient and sub- transient reactances from it.

5. '*It is often convenient to express the machine parameters and variables as per unit quantities*'. Support this statement with appropriate reasons. Obtain the following for a 3 phase star-star 4 pole 1440 rpm symmetrical induction machine having line voltage 440V and a line current 16A :

   a. Base power

   b. Base stator variable angular velocity

   c. Base rotor variable angular velocity

   d. Base torque.

6. Develop the voltage and flux equations for a three phase induction machine using common reference frame concept. Assume stator referred rotor variables for the analysis.

7. Explain why the base torque is not considered to be equal to the rated torque in per unit representation? What is the purpose of using synchronously rotating reference frame?

8. Derive the per unit voltage and acceleration equations of a three phase induction machine in rotor flux fixed synchronously rotating reference frame using dq transformation.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.