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Total Number of Pages : 01

M.TECH

AR-18

M.TECH 1<sup>ST</sup> SEMESTER EXAMINATIONS(BACK), NOV/DEC 2019  
PE, MPEPC1020

MODELING AND ANALYSIS OF ELECTRICAL MACHINES

Time: 3 Hours

Max Marks : 70

The figures in the right hand margin indicate marks.

PART-A

(10 X 2=20 MARKS)

1. Answer the following questions.

- Define & write relation for stored magnetic energy.
- Write voltage & torque equation of shunt motor.
- What is meant by dynamic performance of three phase fault in induction motor?
- Draw equivalent circuit of three phase induction motor?
- What is meant by reference frame theory?
- Define critical time?
- Why synchronous motor is constant speed motor?
- What is hunting & how it can be prevented?
- What is brushless DC motor?
- State the need of computer simulation.

PART-B

(5 X 10=50 MARKS)

Answer any five questions from the following.

- Analytically, derive an expression for MMF of three phase winding.
  - From the basic equation, derive an expression for voltage in d-axis & q-axis for synchronous machine
- Explain single & double excited system.
  - Why damper bars are used? Explain its significance
- Explain the method for two phase to three phase transformation
  - Explain the mathematical modeling of a single phase induction motor.
- Describe some applications where two phase to three phase transformation is required.
  - Derive the torque equation of a three phase induction machine.
- Derive the voltage equations of a synchronous machine in rotor reference frame.
  - Derive the mathematical representation of a synchronous machine.
- State the principles of electromechanical energy conversion.
  - For a doubly excited system, the inductances are approximated as follows, the coils are energized with direct currents  $I_1=0.7A$ ,  $I_2=0.8A$   
 $L_1 = 11 + 3 \cos 2\theta$  H     $L_2 = 7 + 2 \cos 2\theta$  H     $M = 11 \cos \theta$  H  
    - Find the torque as a function of  $\theta$ , and its value, when  $\theta = -50^\circ$
    - Find the energy stored in the system as a function of  $\theta$
- Write Short notes on
  - Three phase symmetrical induction machine
  - Reluctance Motors