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# MEPE - 204

## M.E./M.Tech., II Semester

Examination, December 2015

## Modeling And Simulation of Drives

*Time : Three Hours*

*Maximum Marks : 70*

*Note :* i) Attempt any five questions.

ii) All questions carry equal marks.

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1. a) Obtain mathematical modeling in matrix form for a given separately excited DC motor.
   b) Obtain the voltage equations in rotor's dqo reference frame of synchronous machines.

2. a) Describe four quadrant operation of a motor driving a hoist load with the help of a labelled diagram.
   b) Derive the condition of steady-state stability, at a given operating speed, in terms of motor and load torques and illustrate the case of induction motor driving a constant load torque.

3. a) Derive an expression for the temperature rise of an electric motor. State the assumptions made.
   b) A 50kW motor with a heating time constant of 100 minutes has a final temperature rise of 50°C on continuous rating. Find the half-hour rating of the motor for this temperature rise assuming that it cools down completely, between each load period. The motor Gas maximum efficiency of 80% at its full load.





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4. a) What is meant by soft start? State and explain any one one soft start scheme employed for induction motor.
   b) Discuss with the help of a suitable schematic diagram, the operation of a CSI fed AC drive.

5. a) Explain why chopper fed dc drives are considered superior over converter fed ones.
   b) Explain how can open loop system of speed control of a dc motor be converted into closed loop system?
   c) Explain how is variable current variable frequency control is superior to variable voltage variable frequency control.

6. a) A three-phase induction motor is operating on unbalanced supply. Using generalized machine theory obtain its equivalent circuit.
   b) Describe the concept of vector control of AC drives.

7. a) Draw a flow chart the simulation of torque of three-phase induction motor.
   b) Write an algorithm for simulation of performance of synchronous motor drive on MATLAB.

8. Write short notes on any two of the following :
   i) Reference frame theory
   ii) Scalar control of Induction motor
   iii) Derating of AC machine
   iv) MATLAB simulation of DC machine

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