

**Modelling And Simulation of Drives***Time : Three Hours***Maximum Marks: 70***Note:* Attempt any five questions. All questions carry equal marks.

1. a) What do you understand by mathematical modelling of an electrical machine? Give its significance with suitable example.  
b) Explain different reference frame theory approach of mathematical modelling of electrical machine.
2. a) Write down park's & Inverse Park's transfer motion equations. How it can be implemented in simulation.  
b) Obtain a complete mathematical model of dc shunt motor and derive its linearized model from it. rgpvonline.com
3. a) Discuss various factors of selection of motor and its size for particular application.  
b) Explain stability analysis in stator voltage controlled 3-phase induction motor with emphasis on four quadrant operation.
4. a) Draw and explain speed-torque characteristics of 3-phase induction motor in motoring, braking and generation regions. The maximum torques in motoring and generating region are equal or unequal. Give the reason for your answer.
- b) How the thermal effects can be considered during the design of modelling of electrical machines.
5. a) Differentiate between open-loop and closed loop control of drives with suitable example.  
b) Explain a rectifier-fed closed loop control scheme of a dc shunt motor. How the controller can be designed in rectifier fed system for above scheme.
6. a) What are the main differences between chopper-fed and converter-fed dc motor closed-loop drive system. Discuss their limitations also.  
b) Explain the operation of 3-phase induction motor with impressed voltage of non-sinusoidal voltage waveform with equations involved.
7. a) How the harmonic losses are generated in 3-phase induction motor. Discuss its adverse effects on its performance. How these losses can be suppressed or reduced?  
b) Explain basic principle of vector control of 3-phase induction motor. Draw different reference frames and obtain equation of current vector in these different reference frames.  
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8. a) Discuss the steps involved in simulation of a drive system in MATLAB environment. Use some example, if required.  
b) Explain how following can be simulated in MATLAB-  
i) Large matrix  
ii) State-space model of a system  
iii) Equations.