Code No: A4301/ C4201, C4301, C5401

NR/R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations, March 2011
MACHINE MODELLING AND ANALYSIS
(COMMON TO POWER ELECTRONICS, POWER AND INDUSTRIAL DRIVES,
POWER ELECTRONICS AND ELECTRIC DRIVES)

Time: 3hours   **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) What is Generalized machine theory? What are restrictions of generalized machine theory?

 b) What is primitive machine? Explain primitive form of various machines? [6+6]

2. Explain the generalized mathematical model of the series motor. List out the assumptions pertaining to the use of generalized mathematical model of dc machines. [12]

3. Develop the mathematical model of a dc compound motor in matrix form. Mention why no transformation is required for doing the analysis of dc machines with the help of Keon's primtive machine. [12]

4. Discuss in detail about phase transformation and active transformation. [12]

5. Draw the basic circuit model for a 3-phase induction motor for stator as well as rotor currents. [12]

6. Derive the dynamic model of a 3-phase induction motor in synchronizing rotating reference frame and average these equations in state variable form and keep them in matrix form. [12]

7. Derive the expressions for armature mutual inductances of a salient pole synchronous machine form a consideration of its basic parameters. [12]

8. A separately excited dc motor fed from SCRs has the following data: Total resistance of motor armature & SCR circuit R=0.05Ω; Total inductance of motor armature & SCR circuit, L = 0.01H; No load source voltage = 250V; Inertia of rotating parts, J=18 kg-m^2, Motor torque constant, K_m = 3 Nm/armature amperes; friction and windage constant, D=0.
   1. Find the undamped natural angular frequency and the damping ratio of the motor system.
   2. If the motor takes a no-load current of 10A, calculate it's no load speed.
   3. For a sudden applied torque of 1000 Nm on the motor shaft, calculate the ultimate speed drop. [12]

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