

End Semester Examinations - 2015-16 Even Semester - May 2016

14EE3040 Simulation of Power Electronic Systems

Set B

Time : 3 hrs
Total Marks: 100

1. a) Classify the simulation tools. (5)
b) Derive the state space model of a buck-boost converter. (15)

OR

2. a) Write a MATLAB function that takes as input three numbers a, b and c and prints out either the solutions of the quadratic equation $ax^2 + bx + c = 0$, when these solutions are real, or a message indicating that the solutions are not real. (5)
b) Write a MATLAB script files to analyze, single phase half-wave controlled rectifier and three phase Rectifier. (15)
3. a) Draw the SIMULINK model to solve the differential equation of RL Circuit. The excitation is a step voltage. Also, draw the frequency domain SIMULINK model. (5)
b) How will you create custom blocks in MATLAB/SIMULINK? (15)

OR

4. a) Simulate the step response of RLC circuit by using “simpowersystems block set”. (5)
b) An induction motor is driving a pump load and a constant torque load. Perform the simulation using MATLAB “simpowersystems block set” with the provisions to verify the voltage and current waveforms, their frequency spectrum and various mechanical quantities. Clearly mention the parameters. (15)
5. a) Write the importance of Control-Power Interface Block. (5)
b) Define Parameter Sweep of a circuit. How will you perform parameter sweep in PSIM? (15)

OR

6. a) List the various Error/Warning Messages in PSIM. How will you rectify the errors? (5)
b) Write the steps to be followed to simulate a Wind Energy Conversion System in PSIM. Draw the PSIM schematic of a Wind Turbine Driving a DC Generator. (15)
7. Simulate a single-phase Sinusoidal PWM Inverter using PSIM. Show the block to measure the fundamental component of the output voltage. Observe the frequency spectrum using FFT for the current waveforms. (20)

OR

8. Simulate the BLDC drive using PSIM. Mention all the simulation parameters clearly. (20)

9. a) Draw a typical sinusoidal waveform. Mention the associated parameters. Describe the method of producing this waveform in PSpice. (5)
- b) A half-bridge resonant inverter with BJT switches is controlled with the control voltages V_{g1} and V_{g2} . Use PSpice to (i) plot the instantaneous output current i_o and the instantaneous input supply current i_s and (ii) calculate the Fourier coefficients of the output current i_o . Select suitable parameters. (15)

Wishing you All the Best
