GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VII • EXAMINATION – WINTER 2013

| S | Subject Code: 172401 Date: 26-11-20 | | 13 | |
|--------------------------------------|-------------------------------------|--|----------|--|
| Time: 10:30 TO 01:00 Total Marks: 70 | | |) | |
| 11 | 1511 44 | Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks. | | |
| Q.1 | (a) | Define modeling. Draw and Explain the block diagram of Power Electronics System with reference to modeling. | 07 | |
| Q.2 | (b) (a) | State capacitor charge balance principle and explain its use in buck converter. Derive the transfer function for armature controlled DC Motor and develop block diagram for the same. | 07 07 | |
| | (b) | Do as directed: 1. Draw the equivalent circuit during two sub intervals for boost converter including copper loss. 2. Draw inductor voltage and capacitor current waveform for the above | 02 | |
| | | Draw inductor vortage and capacitor current waverorm for the above circuit. Draw and Explain output voltage v/s duty cycle graph. OR | 02 | |
| | (b) | Do as directed: | | |
| | | Draw the equivalent circuit during two sub intervals for cuk converter. Draw inductor voltage and capacitor current waveform for the above circuit. | 02 02 | |
| Q.3 | (a) | 3. Draw and Explain graph for DC conversion ration of the cuk converter. What is feed forward control? Explain working of open loop control with feedforward for an up/down convertor with necessary circuit and waveform. | 03 07 | |
| | (b) | Explain the working of the buck-boost converter with neat circuit diagram and necessary waveforms. Explain the graph for DC conversion ratio M (D) with duty cycle. | 07 | |
| ~ • | | OR | ~- | |
| Q.3 | (a) | what is feedback control? Explain the closed loop of controlled rectifier with necessary circuit diagram and waveform. | 07 | |
| ~ . | (0) | with necessary circuit and waveform. | 07 | |
| Q.4 | (a) | Explain the basic AC modeling approach using buck boost converter example and draw the average inductor voltage and inductor current waveform. | 07 | |
| | (b) | Develop state space model of basic buck converter. | 07 | |
| Q.4 | (a) | What is canonical circuit model? Explain the development of canonical circuit model based on physical arguments | 07 | |
| | (b) | Develop state space model of buck boost converter | 07 | |
| Q.5 | (a) | Derive and plot the control-to-output transfer function for circuit of small signal | 07 | |
| | (b) | Draw and explain the modeling of PWM. | 07 | |
| | . , | OR | | |
| Q.5 | (a) | Derive and plot the line-to-output transfer function for circuit of small signal equivalent circuit model of buck boost converter. | 07 | |
| | (h) | What is linearization? Explain linearized sizewith far an un/down converter in | 07 | |

(b) What is linearization? Explain linerized circuit for an up/down converter in **07** discontinuous conduction using necessary circuit, equation and waveform.
