Q1. Induction Motor Characterization and DOL Operation

This question will have two main separate parts, each worth 10 marks. The parts can be two of the following three options:

(a) Characterization of SCIM from open-circuit and locked-rotor tests.

(b) Characterize of SCIM from Teco-Westinghouse data sheet. To shorten question, assume Rs=Rr’ and Lls = Llr’.

(c) Analysis of machine for steady-state motoring or generating.

Q2. Permanent Magnet AC Machines and Induction Motor Speed Control

This question will have two main separate parts

(a) Characterization and operation of the PMAC machine. 8 marks.

(b) Variable-speed operation of the SCIM.

a. Machine wiring and simple part on SCIM from Teco-Westinghouse data sheet. 8 marks.

b. Analysis of V-Hz operation of SCIM for motoring or generating under start-up or variable speed.

Related inverter power electronics (dc link, modulation index, etc) will not be examined in this question.

Q3. Non-isolated Dc-dc Converters

This question will have two main separate parts, each worth 10 marks.

Usual topics, buck vs. boost, CCM vs. DCM, interleaving.

Q4. Isolated Dc-dc Converters

This question will have two main separate parts

(a) Forward converter.

(b) Flyback converter. CCM vs. DCM.

Q5. Power Semiconductors

This question will have two main separate parts

(a) Calculation of switching times. Usual issues: turn-on vs. turn-off, given data set vs. data sheet,

(b) IGBT loss for high-power dc-dc. Need to calculate basic currents in circuit for CCM, DCM, etc.