4/12/2015 BE Sem VII Elex (CBGS) - PE II

QP Code : **5939**

(3 Hours) [Total Marks :80

N.B. : (1) Question no. **1** is **compulsory.**
(2) Solve any **three** questions out of remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Solve **one complete** question together.
(5) **Assume** suitable **data** wherever **necessary.**

1. Attempt any **four** from the following:-
   (a) What are the advantages of SVM over the conventional Sine wave PWM? Explain. 5
   (b) List the merits and demerits of online and offline UPS. 5
   (c) Explain regenerative braking for DC motors. 5
   (d) Explain in brief the effect of sourceinductance in single phase fully controlled bridge rectifier. 5
   (e) Explain the concept of UPS and give classification of UPS system. 5

2. (a) Explain clearly the steps involved in Space Vector Modulation for three phase voltage source inverter. 10
   (b) A single phase full-wave mid-point converter with freewheeling diode as shown below in Fig. Q2(b) is supplied from a 120V, 50 Hz supply with a source inductance of 0.33 mHenry. Assuming that the load current is continuous at 4A, find the overlap angle for 10
      (i) Transfer of current from a conducting thyristor to the commutating diode.
      (ii) From the commutating diode to a thyristor when the firing angle is 15 degree.

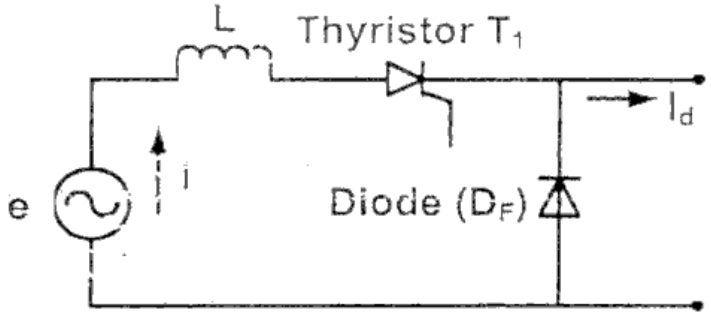

Fig.Q2 (b)

3. (a) Derive and explain the state-space model of Buck converter. 10
   (b) Explain the PI (Proportional + Integral) control of DC-DC converter with the help of neat diagram. 10

4. (a) Derive the expressions for output voltage and current for a single phase fully controlled bridge rectifier with source inductance using equivalent circuit. 8
   (b) What are SMPS? Give classification and explain any SMPS circuit in detail. 6
   (c) Draw and explain the battery charging circuit involving power electronics system. 6

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5. (a) A separately excited DC motor is supplied from 230V, 50Hz source through a single-phase half wave controlled converter. Its field is fed through single-phase semi-converter with zero degree firing angle delay. 10
Motor resistance = 0.70Ω, Motor constant = 0.5 volts sec/rad.
For a rated load torque of 15 NM at 1000 rpm and for continuous ripple-free current, determine:
(i) Firing angle delay of the armature converter.
(ii) RMS value of thyristor & freewheeling diode current.
(iii) Input power factor of the armature current.

(b) Explain various methods of speed control for 3-phase induction motor. 10

6. Write short notes on:
(a) Comparison of fly-back and forward converters used in SMPS. 7
(b) Power electronics applications in induction heating. 6
(c) Slip power recovery scheme for induction motor using Kramer Drive below sub-synchronous speed. 7