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BIEL-019

B.Tech. ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00301

Term-End Examination

December, 2013

BIEL-019 : POWER ELECTRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any five** question in all. All questions carry **equal** marks. Missing data may be suitably assumed . Use of calculator is **permitted**.*

1. (a) Draw the static V-I characteristics of SCR and explain its various modes of operation. 7

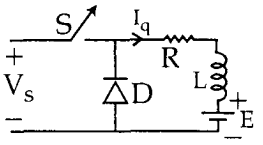
(b) Compare power transistor, power-MOSFET and 1GBT with reference to power switching applications. 7

2. (a) Explain the operation of a single phase fully controlled bridge converter feeding a highly inductive load. Draw waveforms for the output voltage, load current and source current. **10**

(b) Define di/dt and dv/dt ratings of SCR. **4**

3. (a) Explain briefly the step - up chopper with neat circuit diagram. Also, write the applications of chopper. 7

(b) The step down chopper below is operated at the switching frequency $f_s = 10$ kHz. Find the duly cycle 'k' so that average load current $I_q = 2A$. 7



Where $V_s = 100V$; $E = 40V$; $L = 5mH$; $R = 5\Omega$ and diode D is an ideal diode.

4. (a) Explain the operation of a single phase full bridge inverter. Draw waveshapes for the output current when : 10

(i) Load is purely resistive

(ii) Load is purely inductive

(iii) Load is R-L-C under damped.

Justify the above waveshapes for different loads

(b) What are the advantages of PWM inverters ? 4

5. (a) Give schematic diagram to implement dynamic braking and regenerative braking of d.c separately excited motor using d.c chopper and explain its working. 10

(b) The Junction capacitance of a thyristor is 25 pF. The latching current of thyristor is 15 mA. If a capacitor of 100pF is connected across the thyristor, determine the critical dv/dt. 4

6. (a) Describe the conventional Scherbius scheme of slip energy recovery and enumerate its drawback. **10**

(b) List out the advantages of v/f control as applied to a synchronous motor. **4**

7. (a) Give comparisons of DIAC and TRIAC.

(b) What is thermal runaway of a thyristor ? How thermal runaway of a thyristor can be prevented ? **4x3½=14**

(c) Write advantages of CSI over VSI

(d) What is a free wheeling diode ? Write its advantages.