Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

CPEE 5306

Fifth Semester (Special) Examination – 2013

POWER ELECTRONICS

BRANCH : AEIE, EC, IEE

QUESTION CODE : D 295

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) Draw the V-I characteristic of an IGBT.

   (b) What is the advantage of cosine law triggering scheme ?

   (c) Explain the function of snubber circuit.

   (d) What is non repetitive peak reverse voltage rating of SCR ?

   (e) How is the reactive power of a 1-Ph fully controlled rectifier affected by the firing angle?

   (f) Draw the source current wave form for a single phase semi converter feeding R-L load under the assumption that the load current is continuous and ripple free having a value of 20 A and for a firing angle of 60°. Find the rms value of thyristor current.

   (g) Give the advantages of Voltage Source Inverter over Current Source Inverter.

   (h) Give the chopper circuit for regenerative braking of DC motor.

   (i) What are the advantages of 180° conduction mode 3-Phase VSI over 120° conduction mode ?

   (j) Give two advantages of HVDC transmission.

2. (a) Draw the gate characteristic of SCR and explain its gate protection circuit. 5

   (b) What are the various problems that arise in the series operation of SCRs ? How are they overcome ? 5

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3. (a) Explain with relevant circuit diagram and waveforms the operation of UJT triggering scheme. 5

(b) Explain the load commutation principle for a thyristor based system with suitable circuit diagram and relevant waveforms. 5

4. (a) What are the merits and demerits of semi converter over full converter? 5

(b) A single phase full converter feeding RL load has the following data. Source voltage = 230 V 50 Hz, R=10 Ω, firing angle = 45°. If the load inductance is large enough to make the load current virtually constant, compute : 5

(i) the average value of load voltage and load current.

(ii) the input power factor

5. For a 3-Phase fully controlled bridge rectifier operating from a 3-Phase, 415 V, 50 Hz supply with inductive load, derive the following : 10

(a) average output voltage

(b) rms output voltage

(c) distortion factor

(d) harmonic factor

(e) transformer utilization factor(TUF)

6. (a) Explain the working of a parallel inverter employing feedback diodes with the help of neat circuit diagram and relevant waveforms. 5

(b) Compare between voltage source inverter and current source inverter. 5

7. (a) Explain the operation of a auxiliary voltage commutated chopper with circuit diagram and relevant waveforms. 5

(b) Explain the operational principle of integral cycle triggering. 5

8. Write short notes on any **two** of the following : 5×2

(a) Static V-I characteristics of GTO

(b) Effect of source inductance in the performance of full converter

(c) Modified Mc-Murray Bedford inverter

(d) UPS.
