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53 (IE 602) PWEL

2017

**POWER ELECTRONICS**

Paper : IE 602

Full Marks : 100

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

Answer **any five** questions.

1. (a) Draw and explain the I-V characteristics of an SCR. 7
- (b) How GTO can be turned off with gate? Explain with two transistor model. 8
- (c) Give a comparison between power BJT and power MOSFET. 5
2. (a) What is safe operating area? Draw the RBSOA and FBSOA of a BJT. 5
- (b) Draw the equivalent circuit of an MCT and an IGBT. 5

Contd.

- (c) How a thyristor can be protected against high  $di/dt$  and high  $dv/dt$ ? 10
3. (a) Explain single phase half wave rectifier with RL load. 10
- (b) Explain a three phase controlled rectifier with R-load. 10
4. (a) What is a Chopper? Explain the principle of a chopper. 8
- (b) Explain the working of step up, step down, step up-step down chopper. 12
5. (a) What is an inverter? Explain a McMurray Bedford inverter. 10
- (b) A single phase full bridge inverter is connected to an RL load. The circuit is initially relaxed. For a dc source voltage of  $V_s$  and output frequency  $f = \frac{1}{T}$  obtain expression for load current as a function of time for the first two half cycles of the output voltage. 10

6. (a) What is an SMPS ? Explain *any one* configuration of SMPS. 10
- (b) What is an UPS ? What are the different types of UPS ? Explain each. 10
7. Write short notes on :
- (a) Vector control of induction motors
- (b) Power diodes.  $10 \times 2 = 20$
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