Total No. of printed pages = 3

19/5th Sem/DEE504

2021

POWER ELECTRONICS

Full Marks – 100

Time – Three hours

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

Answer all *five* questions.

1. (a) What do you mean by the term "junction" in semiconductor devices? 2

   (b) What is the function of the drift region found in a power diode? Briefly explain how it affects the characteristic of a diode. 4

   (c) Draw the I-V characteristics of a power BJT and define the important points in the curve. 5

   (d) Draw the structure of a power MOSFET clearly showing the parasitic BJT and parasitic diode in it. 5

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(e) State four differences between BJT and MOSFET. 4

2. (a) Differentiate between controllable and semi-controllable switches with two examples of each type. 3

(b) Explain the different modes of operation of an SCR with the help of its static I-V characteristics. 5

(c) Describe the method of line commutation to turn-off a thyristor. 5

(d) With the help of voltage and current wave-forms, explain the working of a single phase half-wave circuit with R-L load. 7

3. (a) Describe the various methods that can be applied to turn-on a thyristor. 8

(b) What is a firing circuit ? Draw the circuit diagram of Resistance firing circuit of a thyristor and briefly explain its working. 6

(c) Describe the structure and working of a triac. 6

4. (a) What is the main function of a DC chopper ? Deduce the output voltage expression for an elementary chopper circuit. 5

(b) Describe the various control strategies for varying the duty cycle of chopper. 6

(c) What is an inverter ? Draw the circuit diagram of a single phase full-bridge inverter and explain its working. 7

(d) What is a cycloconverter ? 2

5. Write short notes on any *four* : 5×4=20

(i) GTO

(ii) UJT

(iii) IGBT

(iv) Load commutation technique

(v) BJT as a switch

(vi) Two transistor model of thyristor.