CBCS SCHEME

USN | | | | | | | | | | |

15EE53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023
Power Electronics

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the different types of power electronic circuits. **(08 Marks)**

b. Explain the single phase full wave diode rectifier with neat circuit and waveform for R-L load. **(08 Marks)**

OR

2 a. Explain the diode reverse recovery characteristics. **(05 Marks)**

b. Explain the operation of free-wheeling diode with switched R-L load. **(06 Marks)**

c. Single phase full wave rectifier with centre tapped transformer has a purely resistive load of R. Determine :
(i) Efficiency
(ii) Form factor FF
(iii) Ripple factor (RF) **(05 Marks)**

Module-2

3 a. Explain the steady state characteristics of MOSFET. **(05 Marks)**

b. Explain how pulse transformer and optocouplers are used for isolation. **(06 Marks)**

c. Discuss the IGBT performance. **(05 Marks)**

OR

4 a. Explain the switching characteristics of BJT. **(08 Marks)**

b. Discuss the different techniques for optimizing the base drive of a transistor. **(08 Marks)**

Module-3

5 a. Explain the characteristics of thyristor with neat diagram. **(08 Marks)**

b. Explain the characteristics of unijunction transistor with relevant waveform. **(08 Marks)**

OR

6 a. Discuss any four types of thyristor. **(08 Marks)**

b. With the help of two transistor model derive an expression for anode current and explain. **(08 Marks)**

Module-4

7 a. Explain the single phase full wave converter with neat diagram and waveform. **(08 Marks)**

b. Explain the single phase full wave AC voltage controllers with circuit and waveform for resistive load. **(08 Marks)**

OR

8 a. Explain the three phase full wave converter with circuit and waveform. (08 Marks)

b. A single phase full wave ac voltage controller has a resistive load of R = 10 Ω and the input voltage is V_S = 120 V(rms), 60 Hz. The delay angles of thyristors T_1 and T_2 are equal $\alpha_1 = \alpha_2 = \alpha = \frac{\pi}{2}$. Determine:

(i) The rms output voltage V_O

(ii) The input power factor (PF)

(iii) The average current of thyristors I_A

(iv) The rms current of thyristors I_R (08 Marks)

Module-5

9 a. Explain the operation of step-down chopper with neat circuit and waveform for R-L loads. (08 Marks)

b. Explain the operation of single phase full bridge inverter with circuit and waveform. (08 Marks)

OR

10 a. Explain the classification of chopper. (08 Marks)

b. Discuss the different techniques of voltage control of single phase inverters. (08 Marks)

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