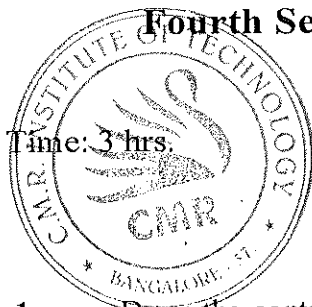


--	--	--	--	--	--	--	--	--	--



Fourth Semester B.E. Degree Examination, June/July 2016

Power Electronics

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Draw the control characteristics of the following: i) SCR; ii) BJT; iii) MCT; iv) GTO; v) MOSFET. (10 Marks)
- b. Explain any four industrial applications of power electronics. (10 Marks)
- 2 a. What is a MOSFET? Draw static and switching characteristics of a MOSFET and explain the operation of MOSFET as a switch. (12 Marks)
- b. A simple transistor switch is used connect a 24V DC supply across a relay coil, which has a DC resistance of 200Ω . An input pulse of 0 to 5V amplitude is applied through a series base resistance R_B at the base so as to turn on transistor switch. Calculate, i) ICS ; ii) Value of resistor R_B , required to obtain over drive factor of 2; iii) Total power dissipation in the transistor that occurs during the saturation state. (08 Marks)
- 3 a. With neat circuit diagram and waveforms explain R-triggering technique of SCR. (08 Marks)
- b. Derive an expression for the anode current of thyristor with the help of two transistor analogy. (08 Marks)
- c. An SCR is connected in series with a 0.5H inductor and 20Ω resistance. A 100V DC voltage is applied to this circuit. If the latching current of the SCR is 4mA, find the minimum width of the gate trigger pulse required to properly turn-on the SCR. (04 Marks)
- 4 a. What do you mean by natural and forced commutation in thyristor circuits? Explain with waveform and circuit complimentary commutation. (12 Marks)
- b. Explain external pulse commutation with neat circuit and waveform and derive an expression for circuit turn off time. (08 Marks)

PART – B

- 5 a. What is controlled rectifier? With neat circuit and waveform explain single phase semiconverter with R-load. (12 Marks)
- b. For a 3ϕ fully controlled SCR bridge converter operating from 400V, 3ph ac supply, calculate the average DC output voltage for a firing angle of 45° . Write the necessary diagram. (08 Marks)
- 6 a. Explain the classification of chopper with neat circuit diagram and wave form. (12 Marks)
- b. A step-up chopper has input voltage of 220 V and an output voltage of 660 V. If the non-conducting time of thyristor chopper is $100\mu\text{sec}$, compute the pulse width of output voltage. In case pulse width is halved for constant frequency operation, find the new output voltage. (08 Marks)
- 7 a. What is an inverter? Explain half bridge inverter with R-load. (10 Marks)
- b. Briefly explain performance parameters of an inverter. (06 Marks)
- c. With relevant waveform explain the sinusoidal pulse width modulation of an inverter. (04 Marks)
- 8 a. With the help of neat circuit diagram and waveform explain on-off control and derive an expression for i) RMS value of o/p voltage; ii) Input power factor. (12 Marks)
- b. A single phase half wave ac voltage controller has a resistive load of $R = 5\Omega$ and input voltage $V_s = 120\text{V}$, 60Hz. The delay angle of thyristor is $\alpha = \pi/3$. Determine: i) RMS output voltage; ii) Input power factor; iii) Average input current. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.