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Question Paper Code : 27220

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Electronics and Instrumentation Engineering

EE 6503 — POWER ELECTRONICS

(Common to Mechatronics Engineering, Electrical and Electronics Engineering, Instrumentation and Control Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Holding current and Latching current in SCR.
2. What are the advantages of GTO over SCR?
3. What is overlap angle?
4. Mention some of the applications of converters.
5. What is meant by PWM control in DC Chopper?
6. What is Duty Cycle?
7. Compare CSI and VSI.
8. Give the use of resonant switching.
9. What is integral cycle control?
10. Write the output RMS voltage for single phase AC voltage controller with resistive load.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the structure and different modes of operation with the characteristics of Traic. (16)

Or

(b) (i) Draw the turn-off characteristics of SCR and explain the mechanism of turn-off. (8)

(ii) Discuss in detail about the current commutation method of turn-off SCR. (8)

12. (a) Explain the operation of three phase 3-pulse converter with R-load. Derive for average output Voltage. (16)

Or

(b) (i) Explain the operating principle of single phase dual converter. (10)

(ii) A single phase full converter is connected with R-Load. The source voltage is 230 V, 50 Hz. The average load current is 10 A For R = 20 Ω. Find the firing angle. (6)

13. (a) Explain the working of Buck-Boost converter with sketch and waveforms and also derive the expression for 1 second. (16)

Or

(b) (i) Discuss the principle of operation of DC-DC step down chopper with suitable waveform. Derive an expression for its average DC output voltage. (8)

(ii) A step down dc chopper has resistive load of R=10 Ω and input voltage Vs=200 v. When the chopper remains ON its voltage drop is 2 for a duty cycle of 0.6 Calculate:

(1) Average and R.M.S value of output voltage

(2) Power delivered to load. (8)

14. (a) With the neat circuit and output waveforms, explain the operation of three phase bridge inverter in 120 degree mode of operation. (16)

Or

(b) Explain different methods of voltage control adopted in inverter with suitable waveforms. (16)

15. (a) Explain the working of three phase to single phase cycloconverter with neat circuit diagram and necessary waveforms. (16)

Or

(b) (i) Write a short notes on matrix converter. (6)

(ii) Explain the operation of single phase full wave A.C voltage regulator with help of voltage and current waveform. (10)