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Question Paper Code : 80379

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

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. Specify the basic features of IGBT.
2. What is the purpose of using snubber circuit?
3. Classify the different types of controlled Rectifier.
4. What is the function of freewheeling diode and state its advantages.
5. What are the different classifications of chopper depending upon the direction of current and voltage?
6. What are the different control strategies in DC chopper?
7. Define modulation index and what is its use.
8. What are the applications of CSI?
9. Differentiate ON – OFF control and phase control in AC – AC converters.
10. What is cyclo converter?

PART B — (5 × 16 = 80 marks)

11. (a) Draw and explain the switching characteristics of a thyristor. (16)

Or

- (b) (i) Explain the operating principle of MOSFET. (8)
(ii) Explain the driver and snubber circuit for MOSFET. (8)

12. (a) With relevant wave forms, derive the expression for average and rms value of output voltage in a single phase full controlled converter with RL load. (16)

Or

- (b) (i) Explain the operating principle of single phase dual converter with neat waveforms. (10)
- (ii) A 1 phase full converter is feeding a RLE load with the source voltage of 230 V, the average load current is 10 A and $R = 0.4\Omega$, $L = 2mH$. Find the firing angle α for $E = 120V$ and $E = -120V$. (6)
13. (a) Derive the expression for voltage gain in a dc – dc boost converter and explain the modes of operation with relevant waveforms. (16)

Or

- (b) Explain the working principle of voltage commutated chopper showing the current and voltage waveform across each device.
14. (a) With the neat sketch and output waveforms, discuss the operation of three phase inverter operating in 180° mode. (16)

Or

- (b) (i) Comparison between Voltage source inverter and current source inverter. (8)
- (ii) Explain any one method to reduce the harmonic content in the inverter. (8)
15. (a) Explain the working of three phase to single phase cycloconverter with neat circuit diagrams and necessary waveforms. (16)

Or

- (b) Explain the working of two stage sequence control of AC Voltage controller. (16)