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**Question Paper Code : 91493**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fifth Semester

Electrical and Electronics Engineering

EE 6503 – POWER ELECTRONICS

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

(Regulations 2013)

(Also common to PTEE 6503 – Power Electronics for B.E. Part-Time – Electrical and Electronics Engineering – Fourth Semester – Regulations 2014)

Time : Three Hours

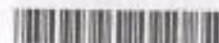
Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Define Holding current and Latching current in SCR.
2. Specify the basic features of IGBT.
3. Classify the different types of controlled rectifier.
4. Why is the power factor of semi converter better than that of full converters ?
5. What is meant by current limit control of a chopper ?
6. What is meant by space vector modulation ?
7. Differentiate VSI and CSI.
8. A single phase half bridge inverter feeds resistive load of  $5\Omega$ . When supply voltage of 120 V, determine the rms value of the fundamental component of output voltage.
9. Compare integral cycle control and phase control in AC voltage controllers.
10. List the applications of cyclo-converter.



## PART - B

(5×13=65 Marks)

11. a) Draw and explain the switching characteristics of a thyristor. (13)  
(OR)
- b) i) Explain the operating principle of MOSFET. (7)  
ii) Explain the driver and snubber circuit for MOSFET. (6)
12. a) Explain the operation of a single phase dual converter with aid of relevant waveforms. Obtain the expression of its instantaneous circulating current. (13)  
(OR)
- b) Explain the operation of a single phase full converter with RLE load using relevant diagrams. Obtain the expression for its average output voltage and RMS value of output voltage. (13)
13. a) Explain the working of Buck-Boost converter with necessary circuit and waveform and also derive the expression for its output voltage. (13)  
(OR)
- b) i) Explain the steady state analysis of step down chopper. (7)  
ii) Explain the control strategies of chopper. (6)
14. a) With a neat sketch, explain the working of three phase bridge inverter in 180 degree mode of operation. (13)  
(OR)
- b) Explain the different methods of voltage control adopted in inverter with suitable waveforms. (13)
15. a) Describe the basic principle of 3 phase to 3 phase cyclo-converter with relevant circuit arrangements and RMS value of per phase output voltage. (13)  
(OR)
- b) i) Describe the working of single phase AC voltage controller with suitable power circuit and output waveform and derive its RMS and power factor value. (8)  
ii) Write short notes on matrix converter. (5)



PART - C

(1×15=15 Marks)

16. a) A single phase full wave AC voltage controller has an input of 230 V, 50 Hz and its feeding resistive load of 10 ohms. If firing angle of thyristor is 120 degree, find the output RMS voltage, input power factor and average current of thyristor. (15)

(OR)

- b) A step down dc chopper has resistive load of  $R = 10\Omega$  and input voltage  $V_s = 200$  V. When the chopper remains ON, its voltage drop is 2 V for a duty of 0.6. Calculate :

- i) Average and R.M.S. value of output voltage.
- ii) Power delivered to load.

(15)