Reg. No. : | | | | | | | | | | | | |

Question Paper Code : X 60502

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020

Fifth Semester

Electrical and Electronics Engineering

EE 2301/EE 51/10133 EE 504/10144 EE 504 – POWER ELECTRONICS

(Common to Instrumentation and Control Engineering)

(Regulations 2008/2010)

(Common to PTEE 2301/10144 EE 504 – Power Electronics for B.E. (Part-Time) Fourth Semester – Electrical and Electronics Engineering Regulations 2009/2010)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is meant by switching loss in devices ?
2. What is the need for snubber circuit ?
3. Why is power factor of semi converter better than full converter ?
4. What is the inversion mode of rectifiers ?
5. Define the term duty cycle in dc-dc converters.
6. What is a DC chopper ?
7. In a CSI, if frequency of output voltage is 'f ' Hz, what is the frequency of voltage input to CSI ?
8. What is space vector ?
9. What is a matrix converter ?
10. Enumerate some of the industrial applications of a cycloconverter.

PART – B **(5×16=80 Marks)**

11. a) i) Compare and contrast the performance characteristics of SCR and MOSFET. **(8)**

ii) Discuss any two types of commutation circuits used for SCR in detail. **(8)**

(OR)

b) Discuss in detail the static and switching characteristics of IGBT. **(16)**

12. a) With necessary circuit and waveforms, explain the principle of operation of 6-pulse converter. Derive the expression for average output voltage in it. **(16)**

(OR)

b) i) A single phase two pulse bridge converter feeds power to RLE load with R = 6 Ω, L = 6 mH, E = 60V,AC source voltage is 230 V, 50 Hz for continuous conduction. Find the average value of load current for a firing angle of 50°. Incase one of the 4 SCR's gets open circuited. Find the new value of average load current assuming the output current as continuous. **(10)**

ii) Describe the operation of a 1 phase two pulse bridge converter in the inverter mode with RLE load. **(6)**

13. a) i) Discuss the various voltage control methods employed in a chopper. **(8)**

ii) Distinguish between linear power supply and switched mode power supply. **(8)**

(OR)

b) Demonstrate the operation of buck and boost converters with necessary voltage equations and waveforms. **(16)**

14. a) With neat diagram and waveforms explain 3ϕ VSI using transistors operating in 120° conduction mode. Also obtain the expression for rms value of output voltage. **(16)**

(OR)

b) i) Explain Multiple Pulse Width Modulation. **(8)**

ii) Explain Sinusoidal Pulse Width Modulation. **(8)**

15. a) Describe the basic principle of working of 1ϕ – 1 ϕ step down cycloconverter for a bridge type converter. Assume both discontinuous and continuous conduction and draw the load current and load voltage waveforms for both the cases. Mark the conduction of various thyristors. **(16)**

(OR)

b) Write short note on the following :

i) Integral cycle control

ii) Multistage sequence control

iii) Step up cycloconverter

iv) Matrix converter. **(4+4+4+4)**

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