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Question Paper Code : X 67587

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

Sixth Semester

Electrical and Electronics Engineering

EE 1353 A – POWER ELECTRONICS

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

(Regulations 2008)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. List two advantages of GTO.
2. Define 'pinch off voltage' of MOSFET.
3. List the various applications of 6 pulse converters.
4. What are the effects of source inductance in the controlled rectifiers ?
5. What are the disadvantages of frequency modulation scheme compare to PWM scheme ?
6. What is meant by inverting regulator ? Draw the circuit diagram.
7. Write any four drawbacks of basic series inverter.
8. Write any four important requirements of a good inverter.
9. What is meant by phase control ?
10. What is the function of Cycloconverter ?

PART – B

(5×16=80 Marks)

11. a) Sketch switching characteristics of a Thyristor during its turn on and turn off processes. Show the variation of voltage across the Thyristor and current through it during these two dynamic processes. Indicate clearly the various intervals into which turn on and turn off times can be sub divided. Discuss briefly the nature of these curves.

(OR)

- b) With neat diagram, explain the turn on process of TRIAC.



12. a) Describe the working of a single phase full converter in the inverter mode with necessary waveforms. Also derive the expression for average output voltage in terms of source voltage and firing angle.

(OR)

- b) A three phase full bridge converter is connected to supply voltage of 230 V per phase and a frequency of 50 Hz. The source inductance is 4 mH. The load current on DC side is constant at 20 A. If the load consists of a DC voltage source of 400 V having an internal resistance of 1 Ω , then calculate :

i) firing angle

ii) overlap angle in degrees.

(8+8)

13. a) i) Derive the equation for output voltage of a step up chopper. (8)

ii) With necessary circuit and waveforms explain the principle of operation of step down DC to DC converter with RL load. (8)

(OR)

- b) Write short notes on :

i) Buck converter (8)

ii) Cuk converter. (8)

14. a) i) Explain the sinusoidal PWM technique used in inverter. (8)

ii) Explain the operation of a single phase capacitor commutated CSI with R load. (8)

(OR)

- b) i) Describe the working of single phase full bridge inverter supplying R, RL loads with relevant circuit diagram and waveform. (10)

ii) Explain the operation of series inverter. (6)

15. a) Describe how single phase low frequency output voltage can be fabricated from the three phase input voltage ? (with relevant waveforms). Also discuss the operation of positive and negative group phase controlled converters.

(OR)

- b) Discuss the working of a single phase voltage controller connected to RL load with relevant waveforms. Derive an expression for the output current.
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