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Question Paper Code : 23431

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fifth Semester

Electrical and Electronics Engineering

EE 1301 — POWER ELECTRONICS

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

(Regulation 2004/2007)

(Common to B.E. (Part - Time) Fourth Semester Electrical and Electronics Engineering – Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How is MOSFET protected from over voltage and over current?
2. What is meant by delay time and rising time of transistor?
3. Distinguish between power factor and displacement factor.
4. What is meant by inversion mode of rectifier?
5. List the advantages of resonant converters.
6. What is boost converter?
7. Define : Harmonics.
8. Write the applications of inverter.
9. What is meant by off – line UPS?
10. Why are VAR compensators used in power transmission system?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the construction, operation and V – I characteristics of SCR in detail.

Or

(b) (i) Brief the operation of driver circuit and snubber circuit used for a MOSFET. (8)

(ii) Explain the turn – on characteristics of 1GBT. (8)

12. (a) With neat waveforms, explain the operation of 3 – phase fully controlled rectifier. Also derive the expression for its output voltage.

Or

(b) A 230 V, 50 Hz, supply is connected with resistive load of 12 ohms through single phase full wave AC voltage controller. Find the RMS output voltage, supply power factor and average current of thyristor for the firing of 60 degree.

13. (a) Discuss the operation of boost converter and Cuk converter with necessary equations and waveforms.

Or

(b) A 220 V supply is connected with a resistive load of 12 ohms through a DC chopper. The chopping frequency is 1.5 KHz and voltage drop across the chopping device is 2 V. Determine average output voltage, RMS output voltage, chopper efficiency and effective input resistance if firing angle, $\alpha = 0.5$.

14. (a) Explain the operation of 3 – phase voltage source inverter in 120 degree and 180 degree mode of conduction.

Or

(b) Discuss different types of PWM scheme used for controlling an inverter. also discuss the merits and demerits of each scheme.

15. (a) Write short note on the following

(i) Shunt VAR compensator (8)

(ii) UPFC.

Or

(b) Explain the role of power converters in HVDC transmission system with necessary sketches.