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

Question Paper Code : 41237

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Sixth Semester

Electrical and Electronics Engineering

080280054 – POWER ELECTRONICS

(Common to 080280050 – Power Electronics for B.E. (Part-Time) Fifth Semester, Electrical and Electronics Engineering)

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by reverse recovery time of diode?
2. How MOSFET differs from IGBT?
3. What is the effect of source inductance on rectifiers circuit?
4. What is integral cycle control in AC voltage controllers?
5. Define, DC chopper and give its applications.
6. What is cycloconverter?
7. Distinguish between PWM inverter and square wave inverter.
8. Define, Harmonic distortion.
9. What is meant by off-line UPS?
10. What are the merits and demerits of custom-built driver circuits?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the functioning of protection circuit used in a SCR against over voltage and over current. (8)

(ii) Explain the V-I characteristics of IGBT. (8)

Or

(b) A thyristor string is formed by the series and parallel connection of SCRs. The voltage and current ratings of the string are 16kV and 4kA respectively. Available thyristors have the voltage and current ratings of 1.2 kV and 1 kA respectively. The string efficiency is 90% for both series and parallel connections. Calculate the number of SCRs to be connected in series and parallel. If the maximum blocking current is 15 mA and $\Delta Q \max = 25\mu C$, Calculate the values of R and C.

12. (a) Explain the operation of single phase controlled rectifier which can be operated both in rectification and inversion mode.

Or

(b) A 3-phase 6 pulse full converter is connected resistive and inductive load of 10 Ω and 1 H respectively from 3-phase, 220 V, 50HZ, Y-connected supply. For firing angle is 30 degree, determine

(i) average output voltage,

(ii) average output current,

(iii) rms output current,

(iv) average output power.

13. (a) (i) Brief the operation of step-up chopper. (6)

(ii) A step-up chopper has a supply voltage of 100 V and output of 250V. If the off period of chopper is $150\mu s$

(1) Determine the pulse width of output voltage.

(2) Find the output voltage if pulse width is reduced to $\frac{1}{2}$ for constant frequency operation. (10)

Or

(b) (i) Brief the operation of 3-phase to 1-phase cycloconverter with neat waveforms. (10)

(ii) Discuss the concept of time ratio control in Chopper. (6)

14. (a) Discuss the operation of single phase voltage source inverter with R, R-L, and R-L-E load.

Or

(b) Explain how an inverter is controlled using single PWM and sinusoidal PWM technique. Also discuss the merits and demerits of each technique.

15. (a) Discuss any two types of triggering circuit used to control 1-phase controlled rectifiers.

Or

(b) Describe the role of power converters in HVDC transmission system.
