

C 80760

(Pages : 2)

Name.....

Reg. No.

**SIXTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE
EXAMINATION, APRIL 2015**

EC/PTEC 09 L01—POWER ELECTRONICS

Time : Three Hours



Part A

I. Answer *all* questions :

- 1 What are the different methods for turning off a SCR ?
- 2 Mention the advantages of MOSFET over BJT.
- 3 Define Total Harmonic Distortion (THD).
- 4 Write down the expression for the output RMS voltage of a single phase a.c. voltage controller with resistive load.
- 5 What is integral cycle control ?

(5 × 2 = 10 marks)

Part B

II. Answer any *four* questions :

- 6 What are $\frac{dv}{dt}$ and $\frac{di}{dt}$ ratings of a SCR ? What happens if these ratings are exceeded ?
- 7 A 220 V, 1 kW resistive load is supplied by 220 V, 50 Hz source through a single phase fully controlled rectifier. Determine the following for 800 W output :
 - (i) Output voltage.
 - (ii) RMS value of input current.
 - (iii) Displacement factor.
- 8 Explain the working principle of a buck-boost regulator with a neat circuit diagram.
- 9 Explain the working principle of a step-up chopper with a neat sketch.
- 10 Draw the circuit diagram of a bridge inverter and explain its working principle.
- 11 List out the advantages of SMPS over linear power supplies.

(4 × 5 = 20 marks)

Turn over

Part C

Answer all questions.

Module I

12. (a) Explain the basic structure and VI characteristics of a power diode. (10 marks)

Or

- (b) What do you mean by commutation of SCR ? Explain the class D commutation circuit with necessary waveforms.

(10 marks)

Module II

13. (a) Explain the operation of a single phase full bridge converter with RL load for continuous and discontinuous load current.

(10 marks)

Or

- (b) For a single phase transistorized PWM half-bridge inverter derive expressions for fundamental output voltage, inverter gain and harmonic factor.

(10 marks)

Module III

14. (a) Explain the principle of operation of a single phase to single phase cycloconverter with a neat sketch.

(10 marks)

Or

- (b) A step down d.c. chopper has a resistive load $R = 15 \text{ Ohms}$ and input voltage $E_{DC} = 200 \text{ V}$. When the chopper remains ON, its voltage drop is 2.5 V . The chopper frequency is 1 kHz . If the duty cycle is 50% , determine (i) average output voltage, (ii) RMS output voltage, (iii) chopper efficiency, and (iv) effective input resistance of the chopper.

(10 marks)

Module IV

15. (a) Discuss the operation of a CUK regulator with a neat circuit diagram and relevant voltage and current waveforms.

(10 marks)

Or

- (b) Explain the operation of an online UPS with a neat block diagram.

(10 marks)

[4 × 10 = 40 marks]