

D 8499

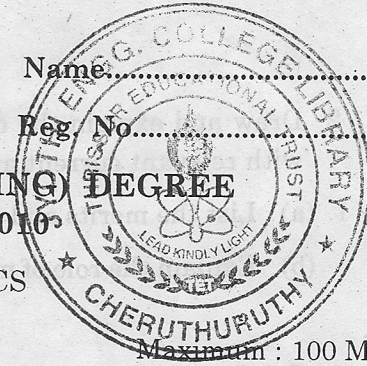
(Pages 2)

Name .....

Reg. No. ....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE  
EXAMINATION, DECEMBER 2010**

AI 04 505—POWER ELECTRONICS



Maximum : 100 Marks

Time : Three Hours

*Answer all questions in Questions I.*

*Answer any one questions II to V.*

- I. (a) Differentiate between SCR, TRIAC, SCS, and SUS.  
(b) Draw and explain the mechanism of the turn-off characteristics of a SCR.  
(c) Derive an expression for average load current for a single-phase half-controlled converter with inductive load.  
(d) List the various techniques of improving power factor in phase controlled converters.  
(e) With a neat circuit diagram, explain the principle of operation of a chopper.  
(f) List different voltage control and PWM techniques used in single-phase inverters.  
(g) With a neat schematic, explain the working of a buck regulator.  
(h) Explain the working principle and role of isolation amplifiers.

(8 × 5 = 40 marks)

- II. 1 Draw the electrical equivalent circuit of a power MOSFET and explain why they are preferred in the inverter applications. Also name the operating limits of the power MOSFET.

*Or*

- 2 Draw and explain briefly the IGBT driver circuit with over current protection. Also, highlight the problems faced in parallel operation.

- III. 1 With a neat diagram and associated waveforms, explain the working of a single-phase AC voltage controller with R load.

*Or*

- 2 Explain the working of a cycloconverter in midpoint and bridge configuration. Also derive an expression of  $V_o$  showing variation of  $V_o$  with firing angle  $\alpha$ .

- IV. 1 Explain in brief, how average voltage across the load is made more than d.c. supply voltage using chopper. Derive the expression for the average voltage.

*Or*

Turn over

- 2 Draw and explain the operation of modified McMurray-Bedford full bridge inverter circuit with relevant current and voltage waveforms.
- V. 1. (a) List the merits and demerits of on-line and off-line UPS.  
(b) Explain the role of micro-controllers in power electronic circuits.

Or

- 2 Briefly explain with neat sketches, the drive design of IGBT.

[4 × 15 = 60 marks]