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Name.....

Reg. No.....

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

AI 04 505—POWER ELECTRONICS

Time : Three Hours

Maximum : 100 Marks

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_0 showing variation of V_0 with firing angle α.

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]