

Exam.Code:0936

Sub. Code: 6675

2054

B.E. (Electrical and Electronics Engineering)

Sixth Semester

PC-EE-602: Power Electronics

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Answer the following:-

- a) Power MOSFET is a voltage controlled device. Why?
- b) What are the different methods to turn on the thyristor?
- c) What is meant by distortion factor?
- d) What is the function of freewheeling diode?
- e) What is meant by PWM control in dc chopper? (5x2)

UNIT - I

- II. Draw the basic structure of IGBT and discuss the physics of the device operation. (10)
- III. Explain the turn-on and turn-off process of a thyristor with suitable diagram. (10)
- IV. Describe class C type of commutation used for thyristors with appropriate current and voltage waveforms. (10)

UNIT - II

- V. Explain the effect of source Inductance L_s on single phase controlled rectifier with suitable waveform and derive the expression for the commutation interval μ and load voltage V_d . (10)
- VI. a) For a 3ϕ dual converter, derive an expression for the circulating current in terms of supply voltage, reactor inductance and firing angle delay. Sketch the relevant voltage and current waveforms, needed for this derivation.
b) Explain time ratio control and current limit control strategies. (7,3)

P.T.O.

(2)

- VII. a) Derive the expression for duty cycle 'D' of a buck-boost converter with suitable waveforms under continuous conduction mode.
- b) In a buck-boost converter operating at 20kHz, $L=0.05\text{mH}$. The output capacitor C is sufficiently large and $V_d = 15\text{V}$. The output is to be regulated at 10V and the converter is supplying a load of 10W. Calculate the duty ratio D. (2x5)