

Printed Pages : 3



EEE-602

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121603

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15

POWER ELECTRONICS

Time : 3 Hours]

[Total Marks : 100

- Note: (1) Attempt all questions.
(2) All questions carry equal marks.

- 1 Attempt any four parts: 5×4=20
- (a) What are the characteristics of an ideal power switching device?
 - (b) Explain the switching characteristics of a BJT.
 - (c) Find the number of thyristors each with a rating of 500V and 75A required for each branch of a series parallel combination for a circuit for a total voltage and current rating of 7.5KV and 1 KA. Assume derating factor of 14%.
 - (d) Explain the significance of latching and holding currents.
 - (e) Explain the steady state and switching characteristics of MOSFET.
 - (f) Explain working of Triac.

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2. Attempt any two parts : 10×2=20
- (a) What is a DC chopper? Describe the various types of chopper configuration with neat and appropriate diagrams.
 - (b) Discuss the two transistor model of a thyristor. Using this model, describe the various mechanisms of turning on a thyristor.
 - (c) Explain the resonant pulse commutation with the help of circuit diagram and waveforms. Explain the effect of accelerating diode.
3. Attempt any two parts:- 10×2=20
- (a) A single phase half controlled bridge operated from the 230 V, 50 HZ mains feeds a resistive load of $100\ \Omega$. If the firing angle is 60° , Calculate,
 - (i) Average output voltage
 - (ii) rms output voltage
 - (iii) total output power
 - (iv) DC output power
 - (v) load current at instant of turn on
 - (b) What do you understand by dual converters? Explain the operation of a $3\ \phi$ dual converter using circulating current mode of operation. How are firing angles of two converters controlled?
 - (c) Discuss the working of $1\ \phi$ full wave ac-dc converter taking into account the effect of source inductance. Draw the output voltage waveform for firing angle of 30° .

4. Attempt any two parts:- 10×2=20
- (a) Describe the basic principle of working of 1ϕ to 1ϕ step down cycloconverter for both continuous and discontinuous conduction. Make the conduction of various thyristor also.
 - (b) Describe 1ϕ ac voltage controller with inductive and resistive loads. Describe an expression for output voltage.
 - (c) Show that the fundamental rms value of per phase output voltage of low frequency for an m pulse cycloconverter is given by:
$$V_{ov} = V_{phm} \pi \sin \pi m.$$
5. Attempt any two parts:- 10×2=20
- (a) Discuss the working principle of a 1ϕ series inverter. What are the advantages and disadvantages of series inverter.
 - (b) Explain operation of a 3ϕ bridge inverter employing 120° mode of operation. Draw waveforms of phase voltages and any one line voltage assuming star connected resistance load.
 - (c) The single phase quasi-square wave bridge inverter operates from a DC supply of 200V at a frequency of 100 Hz and feeds a resistive load of 10Ω calculate:
 - (i) Duration of the ON period if the rms value of the load voltage is 100V.
 - (ii) Peak supply current
 - (iii) Average DC supply current.