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EEE-602

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

PAPER ID : 121603

Roll No.

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.

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 ant 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 600, 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 3ϕ dual converter using circulating current mode of operation. How are firing angles of two converters controlled?

(c) Discuss the working of 1ϕ full wave ac-dc converter taking into account the effect of source inductance. Draw the output voltage waveform for firing angle of 300.

4. Attempt ant two parts:- 10×2=20

(a) Describe the basic principle of working of 1ϕ to 1ϕ step down cycloconverter for both continuous and discontinuous conductions. 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:
Vov=Vphm π sin π m.

5. Attempt ant 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 1200 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 operators 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.

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