Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

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EX-5004 (CBGS)

B.E. V Semester

Examination, November 2018

Choice Based Grading System (CBGS)

Power Electronics Device and Circuit

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Discuss the problems associated with parallel operation of SCRs and how these are overcame? 7
   b) What is Commutation? Give classification and explain each in brief. 7

2. a) Write short note on: 7
      i) Power BJT
      ii) Power MOSFET
   b) Explain two transistor analogy of thyristor. 7

3. a) With the help of neat circuit diagrams and waveforms explain the operation of 3-ϕ fully controlled bridge convertor with RL-Load. 7
   b) Draw the circuit diagram of a 3-phase semiconvertor feeding a RLE load. Draw wave shape of input voltage, firing pulse and output voltage for $\alpha = 0°$ and $\alpha = 30°$. 7

4. a) What is Sinusoidal pulse width modulation? How is it Obtained? Explain with the help of neat diagram. 7
   b) Describe a Morgan chopper with associated voltage and current waveform. 7

5. a) Explain with appropriate waveform the different control strategies used for obtaining variable output voltage from a dc chopper. 7
   b) Discuss the operation of Buck-Boost converter with the help of circuit diagram and voltage and current waveform. 7

6. a) Describe 3-phase to 3-phase cycloconverter with relevant circuit arrangement using 18SCRs. 7
   b) A single phase voltage controller has input voltage of 230V, 50Hz and a load of R = 15Ω for 6 cycles on and 4-cycle off. Determine: 7
      i) RMS output voltage
      ii) Input power factor

7. A single phase fully controlled bridge converter supplies an inductive load. Assuming that the output current is virtually constant and is equal to I_d. Determine the following performance measures if the supply voltage is 230V and if the firing angle is maintained at $\pi/6$ radians 14
   a) Average output voltage
   b) Supply RMS current
   c) Supply fundamental rms-current
   d) Fundamental power factor
   e) Supply power factor

8. With an appropriate power diagram discuss the principle of working of three phase bridge inverter. Draw phase and line voltage waveforms on the assumption that each thyristor conduct for 120° and resistive load is star connected. 14

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