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Total Number of Pages : 02

B.Tech
PCEL4301

5th Semester Back Examination 2018-19
POWER ELECTRONICS
BRANCH : AEIE, EEE, EIE, ELECTRICAL, IEE
Time : 3 Hours
Max Marks : 70
Q.CODE : E379

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)**
- a) What do you mean by latching current and holding current of an SCR?
 - b) Differentiate between IGBT and MOSFET.
 - c) Discuss the conditions that must be satisfied for turning on an SCR with gate signal.
 - d) What do you mean by finger voltage?
 - e) Which among string efficiency and derating factor should be more and why?
 - f) What is zero crossing detector and why is it utilized in a triggering circuit?
 - g) What is semi-converter? In what respect is the operation of single phase semi-converter different from that of full converter?
 - h) A chopper is connected from a source terminal of 230V. The load voltage is of rectangular pulse duration of 1ms, over total time period of 5ms. Calculate the average and rms value of the load voltage.
 - i) What is non-triggering voltage of an SCR?
 - j) What is the significance of PWM technique in an inverter?
- Q2**
- a) What is the need of Snubber circuit and a series inductor for a thyristor? Explain with clear circuit diagram (5)
 - b) Discuss on switching characteristics of GTO during turn-on and turn-off processes. (5)
- Q3**
- a) A 50A thyristor is to be used in parallel with a 150A thyristor. The on-state voltage drops of the thyristors are 1.5V and 1.2V respectively. Calculate the series resistance R that should be connected with each thyristor if the two thyristors have to share the total current 200A into their rating. (5)
 - b) Discuss inverting mode of operation of single phase full wave controlled rectifier. (5)
- Q4**
- a) A single phase ac voltage controller has input voltage 230V, 50Hz and a load of 10 ohms. Find the rms output voltage and draw relevant waveforms at a firing angle of 30° . (5)
 - b) What is cycloconverter? Explain the working of a single phase centre-tap cycloconverter with a simple diagram. Draw the input wave of frequency f and output wave of frequency f/4 for a resistive load. (5)
- Q5**
- a) An R-L load, energized from single phase, 230V, 50Hz source through a single thyristor, has $R=20$ ohm and $L=0.08$ henry. If it is triggered in every positive half cycle at $\alpha=75^\circ$, find current expression as function of time. (5)
 - b) Derive the expression for average output voltage of a 3-phase full converter with a resistive load as a function of firing angle α . (5)

Q6 a) What is chopper? Explain different control strategies of chopper with relevant diagram. **(5)**

b) With all the waveforms, explain the circuit operation of type-C chopper. **(5)**

Q7 Draw and explain for three phase voltage source bridge type of inverter operating under 120° mode. **(10)**

Q8 Write short answer on any TWO : (5 x 2)

a) UPS

b) Push Pull Converters

c) SPWM for voltage control

d) SVC