Registration No : | | | | | | | | | | |

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 : E548

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 is a thyristor? Sketch static I-V characteristics of an SCR?
b) Differentiate between SCR and GTO.
c) Write down the advantages of free-wheeling-diode and, where it is used?
d) What is the difference between DIAC and TRIAC? Draw its static I-V characteristics.
e) What do you mean by delay angle of an SCR?
f) What are the conditions of inverting mode of operation of single phase full wave controlled rectifier?
g) What is the purpose of the di/dt protection in the case of an SCR?
h) The input voltage of a chopper is 220V, load voltage is 150V and the chopping frequency is 4Hz. Find the ON and OFF period of the thyristor in each cycle.
i) Mention the significance of the feedback diodes in voltage source inverter.
j) A thyristor is triggered by a pulse train of 5kHz. The duty ratio is 0.4. If the allowable average power is 100 watt. What is the maximum allowable gate drive power?

Q2 **a)** Discuss the methods of triggering of an SCR. **(5)**
b) Sketch switching characteristics of a GTO during its turn-on and turn-off processes. **(5)**

Q3 **a)** Discuss the unequal current distributions and other operating problems during parallel operation of SCRs. How to overcome it. **(5)**
b) A single phase fully-controlled bridge rectifier feeding a resistive load at certain firing angle. Derive average and rms value of output voltage. **(5)**

Q4 **a)** With all the waveforms, explain the circuit operation of type-D chopper. **(5)**
b) Draw the circuit of a buck converter. Explain its working by drawing the equivalent circuits for its modes of operation. **(5)**

Q5 **a)** What is the effect of source inductance on the operation of single phase controlled rectifier? **(5)**
b) Explain the operation with associated waveforms of a three-phase fully controlled bridge rectifier with resistive and inductive (R-L) load for 60^0 firing angle. Derive the expression for average output voltage. **(5)**

Q6 **a)** Explain the principle of operation of the cycloconverter. Mention some applications of the cycloconverter. **(5)**

b) Explain current source inverter with relevant circuit diagram and waveforms? **(5)**

Q7 Discuss the principle of working of a three phase bridge inverter with an appropriate circuit diagram. Draw phase and line waveforms on the assumption that each transistor conducts for 180^0 and the resistive load is star connected. **(10)**

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

a) SMPS

b) Parallel operation of SCRs

c) Induction heating

d) Single phase ac voltage regulator