Total Number of Pages: 02
B.TECH
PCEL4301

5th Semester Regular / Back Examination 2016-17
POWER ELECTRONICS
BRANCH(S): EE,EEE
Time: 3 Hours
Max Marks: 70
Q.CODE: Y128
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 the disadvantage of dv/dt triggering of SCR?

   b) Differentiate between MOSFET & BJT?

   c) What is the power factor of a single phase full converter with highly inductive load for a firing angle of 45^0?

   d) What is secondary breakdown?

   e) What is the advantage of PWM rectifier over phase controlled rectifier?

   f) What are the difference between freewheeling diode and feedback diode?

   g) Differentiate between on-line and off-line UPS.

   h) Enumerate the difference between VSI & CSI.

   i) What are the difference between flyback converter and buck-boost converter?

   j) Explain the working of a Type-Cchopper.

Q2 **a)** Explain the turn-off operation of GTO with relevant waveforms and describe the times associated with it.What are the advantages of GTO over SCR?   **(5)**

   b) Explain with relevant circuit diagram the V-I characteristics of UJT and theoperation of a Synchronized UJT triggering circuit.   **(5)**

Q3 **a)** A single phase fully controlled converter is operated from 230V, 50 Hz acsupply. The load current is continuous and ripple free with an average value of 5A. For firing angle of α $=\pi/4$, determine(i) THD of input current (ii) Rectification Efficiency. **(5)**

  b) Explain the various protection employed for thyristor with suitable circuit diagram and derive the expression for snubber circuit parameters. **(5)**

Q4 **a)** Draw and explain the operation of a three-phase Semiconverter with R-L-E load under continuous conduction with appropriatewaveforms of (a) Output Voltage (b) Load current (c) phase-A supply current for a firing angle of 90°. **(5)**

  b) A single phase full wave ac voltage controller has a R-L load of R=10Ω & L= 10mH and the input voltage is V_s=230V, 50 Hz. Determine (a) critical firing angle& (b) for a delay angle of 45^0 and extinction angle of 190^0,the rms value of the output voltage. **(5)**

Q5 What is soft switching? Describe the different modes of operation of a L-type ZCS Resonant Buck converter with proper circuit diagram and associated waveforms of inductor current and capacitor voltage. **(10)**

Q6 **a)** Explain the operation of Boost Regulator with suitable waveforms and derive the expression of average output voltage. **(5)**

  b) A Boost Regulator has an input voltage of 10V dc. The average output voltage is 20 V and the average output current is 1 A. The switching frequency is 25 kHz. If the inputside inductance L=100 µH and output side capacitance C=200 µF, determine(i) The duty cycle (ii) The ripple current of inductor (iii)   The ripple voltage of filter capacitor **(5)**

Q7 **a)** Draw and explain the 120^0 conduction mode operation of a 3-ϕ VSI with suitable waveforms of gate pulses, phase voltages &line voltages. **(5)**

  b) Derive the expression of the RMS value of phase voltage, line voltage and the THD content of phase voltage for the above problem. **(5)**

Q8 Write short notes on any two: **(5 x 2)**

  a) Forward Converter
  b) Battery Charging System
  c) Electronic Ballast