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Total Number of Pages : 02

B.Tech  
PEE5I101

5<sup>th</sup> Semester Regular / Back Examination 2019-20

POWER ELECTRONICS

BRANCH : ELECTRICAL

Max Marks : 100

Time : 3 Hours

Q.CODE : HRB074

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Only Short Answer Type Questions (Answer All-10)

(2 x 10)

- Draw the V-I characteristics of power diode.
- Draw the V-I characteristics of thyristor.
- Draw the switching characteristics of SCR of anode current.
- Why series and parallel connection of SCR are required ?
- Why Cosine firing scheme is used ?
- Derive the average output voltage of single phase half wave controlled rectifier with R-L load.
- Derive the average output voltage of single phase Full wave controlled rectifier with R-L load.
- Why GTO is preferred over SCR ?
- What is Time Ratio Control of DC-DC converter ?
- Why 180° mode of conduction is preferred over 120° mode of conduction?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

(6 x 8)

- Discuss the steady state characteristics of BJT.
- Find the time required to deliver a charge of 200Ah through a single-phase half-wave diode rectifier with an output current of 100A rms and with sinusoidal input voltage. Assume diode conduction over half cycle.
- A single -phase full bridge diode rectifier is supplied from 230 V, 50 Hz source. The load resistance of  $R=10\Omega$  and a large inductance so as to render the load current constant. Determine: (i) average values of output voltage and output current, (ii) average and rms values of diode currents.
- A 3-phase bridge rectifier charges a 240V battery. Input voltage to rectifier is 3-phase, 230V, 50 Hz. Current limiting resistance in series with battery is  $8\Omega$  and an inductor makes the load current almost ripple free. Determine power delivered to the battery and load.
- Explain the static I-V characteristics of a thyristor.
- Explain and derive the design of a snubber circuit for a thyristor controlling the power in a load resistance  $R_L$ . The supply voltage is 240V dc and the specified limits for  $dv/dt$  and  $di/dt$  for the SCR are 50 A/ $\mu$  sec and 300 V/ $\mu$  sec respectively. Determine the values of the  $di/dt$  inductance and the snubber circuit parameters  $R_s$  and  $C_s$ .
- Explain the effect of source impedance on the performance of converters with neat sketch diagram and expressions.