Registration No :

Total Number of Pages : 02

## 5th 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)

a) Draw the V-I characteristics of power diode.

b) Draw the V-I characteristics of thyristor.

c) Draw the switching characteristics of SCR of anode current.

d) Why series and parallel connection of SCR are required ?

e) Why Cosine firing scheme is used ?

f) Derive the average output voltage of single phase half wave controlled rectifier with R-L load.

g) Derive the average output voltage of single phase Full wave controlled rectifier with R-L load.

h) Why GTO is preferred over SCR ?

i) What is Time Ratio Control of DC-DC converter ?

j) 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)

a) Discuss the steady state characteristics of BJT.

b) 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.

c) A single -phase full bridge diode rectifier is supplied from 230 V, 50 Hz source. The load resistance of R= 10Ω 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.

d) 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 8Ω and an inductor makes the load current almost ripple free. Determine power delivered to the battery and load.

e) Explain the static I-V characteristics of a thyristor.

f) 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 di/dt and dv/dt for the SCR are 50 A/μ sec and 300 V/ μ sec respectively. Determine the values of the di/dt inductance and the snubber circuit parameters $R_s$ and $C_s$.

g) Explain the effect of source impedance on the performance of converters with neat sketch diagram and expressions.