

SILIGURI INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering
B. TECH. 3rd YEAR 1st SEMESTER 1st INTERNAL EXAMINATION, 2020

PAPER NAME: POWER ELECTRONICS
PAPER CODE: PC EE-504

FULL MARKS: 30
TIME: 1 Hr.

Group-A (Related with CO1)

1. Multiple Choice Type Questions (Answer any three): (1X3=3)

(a) In UJT, with V_{BB} as the voltage across two base terminals, the emitter potential at peak point is given by
i) ηV_{BB} ii) ηV_D iii) $\eta V_{BB} + V_D$ iv) $\eta V_D + V_{BB}$

(b) Secondary breakdown occurred in
i) BJT only ii) MOSFET only iii) Both BJT and MOSFET only iv) SIT only

(c) As compared to BJT, power MOSFET has
i) high switching loss and low conduction loss ii) high switching loss and high conduction loss
iii) low switching loss and low conduction loss iv) low switching loss and high conduction loss

2. Short Answer Type Questions: (5)

Discuss a comparison between Power Transistors, Power MOSFET and IGBT in relation to their application in Power Electronics.

OR

Draw and explain the V-I characteristics of a power diode.

Group-B (Related with CO2)

3. Multiple Choice Type Questions: (1X2=2)

(a) In an SCR, holding current is
i) Equal to latching current I_L ii) Less than I_L iii) More than I_L iv) Not related to I_L

(b) The most commonly used gate triggering signal for thyristor is
i) A short duration pulse ii) a steady dc signal
iii) a high-frequency pulse train iv) a low frequency pulse train

4. Short Answer Type Questions: (5)

Justify the statement, "lower the gate current, the forward break-over voltage is higher" for a thyristor.

OR

Write a short note on Class D commutation of SCR.

Group-C (Related with CO3)

5. Long Answer Type Questions: (15)

A. (i) A single phase fully controlled converter using centre tap transformer is fed from a 230 V, 50 Hz ac source and it is connected with a resistive load $R=10 \Omega$. Determine
a) The output voltage,
b) Form factor,
c) Ripple factor
d) Efficiency
e) Transformer utilization factor at $\alpha=30^\circ$.
Turns ratio of transformer is 1:1. (5)

(ii) What is the difference between semi-converter and full-converter? (4)

(iii) Why semi converter is single quadrant whereas full converter is two quadrant converters? (6)

PTO

SILIGURI INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering
B. TECH. 3rd YEAR 1st SEMESTER 1st INTERNAL EXAMINATION, 2020

PAPER NAME: POWER ELECTRONICS
PAPER CODE: PC EE-504

FULL MARKS: 30
TIME: 1 Hr.

OR

- B. (i) With the help of relevant circuit diagram & waveform, explain the principle of operation of DC-DC step down regulator. Deduce the expression of average & RMS value of output voltage. (7)
- (ii) A Buck converter has input voltage of 220 V and it operates at 50 Hz. The average load current is 50 A. The load resistance is 2 Ω . Determine the value of inductance to limit the maximum peak to peak ripple current through inductor to 10%. Find the value of inductance for maximum ripple current. (8)