Code No: 55013

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, May/June - 2019
POWER ELECTRONICS
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a) Draw the static characteristics of SCR and explain.
 b) Explain the operation of Power IGBT with the help of neat sketch. [7+8]

2.a) Draw the two transistor analogy of SCR and explain in detail.
 b) Explain the commercial specifications of SCR in detail. [7+8]

3.a) Derive the expression for the average voltage of a single phase half controlled converter.
 b) A single phase 230V, 1 kW heater is connected across 1-phase, 230V, 50 Hz supply through a single phase half controlled converter. For firing angle delays of 45 ^{0} and 90^0, calculate the power absorbed in the heat element. [8+7]

4.a) Explain in detail about the operation of single phase fully controlled converters with RLE load.
 b) A single phase full wave converter is operated from a 110V, 60 Hz supply. The load resistance is 10Ω. If the average output voltage is 40% of the maximum possible average output voltage, calculate the delay angle and input power factor. [8+7]

5.a) Draw the circuit diagram of a six pulse converter and explain the operation.
 b) A three phase fully controlled bridge converter operating from a 3 phase 220V, 50 Hz supply is used to charge a battery bank with nominal voltage of 240V. The battery has an internal resistance of 0.01Ω and the battery bank voltage varies by ±10% around its nominal value between fully charged and uncharged condition. Assuming continuous conduction, calculate (i) the range of firing angle of the converter (ii) the range of ac input power factor. [7+8]

6.a) Draw the circuit diagram of a Triac with resistive load and derive the expression for the RMS load voltage.
 b) Explain the operation of a single phase bridge type cyclo converter with resistive load with neat circuit diagram. [7+8]

7.a) What is current limit control? Discuss the principle in detail.
 b) Explain the principle of operation of Jones chopper with necessary sketches. [7+8]

8.a) With the help of neat sketch, explain the working principle of basic series inverter.
 b) Explain in detail about different PWM techniques. [7+8]

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