

Code No: 155CU

**R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, March - 2021

**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 V-I characteristics of power BJT and explain.  
b) Discuss briefly about various gate drive circuits of MOSFET. [8+7]
- 2.a) How UJT works as a trigger source? Explain.  
b) Explain various commercial ratings of thyristor. [8+7]
- 3.a) Explain the operation of single phase dual converter with neat circuit.  
b) A single phase half controlled converter is connected to 230V, 50 Hz supply. The load current can be assumed continuous and ripple free and is 4 A. If the firing angle is  $45^\circ$ , calculate load impedance and load voltage. [8+7]
- 4.a) Explain the working of single phase half controlled converter with RL load.  
b) A three phase half wave thyristor controlled converter delivers power to a delta connected load of  $20\Omega$ . Compute the power delivered to load for an AC input voltage of 230V at the firing angle (i)  $60^\circ$  and (ii)  $90^\circ$ . [8+7]
- 5.a) Derive the relationship between duty ratio and average output voltage in Boost converter.  
b) A buck converter is operated at a duty cycle of 0.8. The load resistance is  $5\Omega$ , the coil reactance of the inductance is  $1.5\Omega$ , and the resistance of the filter capacitor is  $0.1\Omega$ . Determine the voltage gain of the converter. [8+7]
- 6.a) Explain the operation of buck-boost converter with neat sketch.  
b) A boost converter is operating at a switching frequency of 2 kHz. The input voltage is 20 V. Assuming ideal filter inductor and capacitors, determine the average output voltage and average output current. Given the duty ratio as 0.8 and the load resistance is  $10\Omega$ . [8+7]
- 7.a) Explain the operation of single phase bridge inverter with RL load.  
b) Discuss in detail about multiple pulse width modulation. [8+7]
- 8.a) Discuss about the circulating current mode of operation of cyclo converter.  
b) A single phase full wave AC voltage controller operated from 110V, 60 Hz mains supplies an R-L load having  $R = 5\Omega$  and  $L = 25\text{ mH}$ . The firing angle of thyristors is  $60^\circ$ . Determine the output voltage and current. [8+7]