

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER REGULAR EXAMINATIONS

POWER ELECTRONICS

(ELECTRICAL ELECTRONICS ENGINEERING)

NOVEMBER 2005

TIME: 3 HOUR
MARK: 80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

1. The latching current of a thyristor with d.c. voltage source of 100V is 50mA. Calculate the value of minimum width of the gate pulse current when connected to a pure inductive load of 1H. Compute the effect, if a resistance of 10 ohms is connected in series with the load.
2. Explain the operation of a single phase half wave converter for R-load with neat circuit diagram and necessary waveforms. Also derive the output average voltage and current for $\alpha = 30^\circ$.
3. A six pulse thyristor converter is connected to the mains through a transformer of 6% reactance. If the rms value of the voltage at the secondary of the transformer is 415V, calculate the voltage regulation. Neglect resistance in converter. The full load dc current is 200A. What is the value of commutation angle.
4. A single phase full wave ac voltage controller has a resistance load of
(a) 10 ohms and
(b) 5 ohms. The input ac voltage is 230V, 50Hz. For a delay angle of 90° , determine the rms load voltage, rms load current, rms thyristor current and input power factor for above two loads.
5. For a single phase mid-point cyclo-converter, explain the operation of the circuit when fed to R-load with the help of neat circuit diagram and relevant output waveforms for $\alpha = 30^\circ$ and $\alpha = 120^\circ$ for $f_0 = 1/4$ fs.
6. Discuss the operation of class - A and class-B commutation circuits. Also mention their application with the help of neat circuit diagram.
7. Draw and explain the simple SCR series inverter circuit employing class A type commutation. With the help of important waveforms. State the limitations of this inverter.
8. Explain the voltage control in case of single phase bridge inverter circuit, in order to get variable voltage and variable frequency output.