Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2018

Course: Power Electronics, PSEG 327 **Semester: VI**
Program: B.Tech Instrumentation & Control
Time: 03 hrs. **Max. Marks: 100**

Instructions: All question are compulsory

SECTION A

S. No.		Marks	CO
Q 1	State whether turn-off time of a thyristor depends upon junction temperature or it is a constant value.	5	CO1
Q 2	Relate the main reason for connecting a pulse transformer at the output stage of a thyristor triggering circuit.	5	CO1
Q 3	List the name of triggering methods used for an SCR.	5	CO1
Q 4	A single phase half wave controlled rectifier has 400sin314t as the input voltage and R as the load. Calculate the average output voltage for a firing angle of 30^0.	5	CO2
	SECTION B		
Q 5	Describe the characteristic features of discontinuous conduction compared to continuous conduction in a bridge converter in terms of load voltage with neat waveforms.	10	CO2
Q 6	In a type –A chopper, given that source voltage 100 V dc, On period 100 micro sec, Off period 150 micro sec and load R= 2 ohm, L= 5mH with back emf 10 V connected in series for continuous conduction. Calculate the average output voltage and average output current.	10	CO3
Q 7	Draw the circuit diagram of bridge square wave inverter and analyze the output voltage waveform using Fourier transformation.	10	CO2,3
Q 8	Sketch the circuit diagram for step down cyclo converter and draw the waveform for continuous current mode with RL load incurring load commutation.	10	CO4
	SECTION-C		
Q 9	Construct the 5 mode operation of current commutated chopper with neat circuit diagram and waveforms.	20	CO3,4
Q 10	Examine the multi pulse modulation technique for inverter and find the value of pulse width to eliminate 3rd harmonic from the output voltage.	20	CO3

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SECTION A

S. No.		Marks	CO
Q 1	Derive an expression for average output voltage of the step up chopper.	**5**	**CO2**
Q 2	Describe that junction J1 and J3 will become forward biased and J2 reverse biased when a thyristor turn on and conducting.	**5**	**CO1**
Q.3	For an SCR, the gate cathode characteristic has a straight line slope of 140. For trigger source voltage of 20 V and allowable gate power dissipation of 0.5 watts, what is the gate source resistance?	**5**	**CO1**
Q 4	Define the purpose of freewheeling diode connected across R-L load.	**5**	**CO2**
	SECTION B		
Q 5	Explain the principle of operation of step down chopper with neat circuit diagram of waveform. Derive the expression for V_0(avg), V_0(rms), input power and input effective resistance.	**10**	**CO2,3**
Q 6	A 1-phase full bridge inverter has resistive load R = 2.4 ohm the dc input voltage Vs = 48V. Determine i) RMS output voltage at fundamental frequency. ii) The output power iii) The average and peak output current.	**10**	**CO2**
Q 7	Explain the working principle of capacitor commutated current source inverter with neat circuit diagram.	**10**	**CO2,3**
Q 8	Draw the circuit diagram for step up cyclo converter and sketch the waveform for $f_o=6f_s$. Where f_0 is output frequency and f_s is input frequency to cyclo converter.	**10**	**CO4**
	SECTION-C		
Q 9	Construct the 4 mode operation of voltage commutated chopper with neat circuit diagram and waveforms.	**20**	**CO3**
Q 10	Examine the single pulse modulation technique for inverter and also find the value of pulse width to eliminate 5th harmonic from the output voltage.	**20**	**CO4**