Reg. No.



## VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER EXAMINATIONS, APRIL - MAY 2017

## SUBJECT: POWER ELECTRONICS [ELE 3201]

REVISED CREDIT SYSTEM

Time:	: 3 Hours Date: 20 Apri	2017	Max. Marks: 50
Instructions to Candidates:			
	<ul> <li>Answer ALL the questions.</li> <li>Missing data may be quitably assumed</li> </ul>		
	<ul> <li>Missing data may be suitably assumed.</li> <li>Sine Graphs shall be supplied</li> </ul>		
1A.	The triggering circuit of a Thyristor is as shown in current of 10 mA for guaranteed turn-on. Determine the Thyristor under all conditions for variation in Vo	Fig. Q1A. The Thyristor required for turn the value of R required for turn G.	res a gate ning on of <b>(02)</b>
1B.	With the help of a neat sketch, explain the salient feil impact on device behavior.	atures of power BJT`s structure	and their <b>(04)</b>
1C.	With the help of device voltage and current wavefor of a power diode.	ms, explain the switching chara	cteristics <i>(04)</i>
2A.	With the help of suitable arguments, develop the a circuits of an IGBT.	pproximate and the complete e	quivalent <b>(03)</b>
2B.	A half wave fully controlled rectifier is feeding a lepotential of 'E' volts and an internal resistance of output voltage when the conduction angle is maxim for average output voltage.	bad comprising of a dc battery 'R' $\Omega$ . Derive an expression for num possible. Also, sketch the v	having a r average vaveform (03)
2C.	A single phase fully controlled converter is employed and an internal resistance of 0.1 $\Omega$ . The supply volt induced in the output circuit to maintain the current firing angle and the power factor of the supply.	d to charge a battery with an erage is 110 V and sufficient indunt virtually constant at 20 A. D	nf of 95 V actance is Determine <b>(04)</b>
3A.	A three phase full converter is operated from a the supply and the load resistance is $10 \Omega$ . If it is require 50 % of the maximum possible output voltage the the output voltage and output current waveforms.	nree phase star connected 415 ed to obtain an average output n determine the firing angle. He	V, 50 Hz voltage of ence, plot <i>(03)</i>
3B.	List the advantages and disadvantages of circulating mode of operation of Dual Converters.	g mode of operation over non-c	irculating (03)
3C.	With a neat circuit schematic, derive an express converter.	ssion for output voltage of C	uk dc-dc <b>(04)</b>
4A.	A single phase to single phase Cycloconverter is d frequency ratio $f_0/f_i = 1/3$ . The firing delay angle $\alpha$ the circuit schematic and sketch the output volt triggering sequence for $\alpha$ =45°.	elivering power to a resistive for all the thyristors are the sa age and output current with	load .The me. Draw complete <i>(03)</i>

- A buck converter has  $V_s = 30$  V,  $V_0 = 20$  V, and switching frequency of 40 kHz. The output 4B. power is 25 W. Determine the size of the inductor such that the minimum inductor current is 25 % of the average inductor current.
- With the help of neat circuit schematic, plot any two phase voltage waveforms and **4C.** corresponding line voltage waveform for a three phase square wave bridge inverter when conduction angle of each device is 180°.
- 5A. Define the terms (i) amplitude modulation ratio (ii) frequency modulation ratio with respect to pulse width modulation technique. Draw the harmonic spectrum for the output voltage of a single phase full bridge inverter when operated with biplolar switching technique with amplitude modulation ratio of 0.7 and frequency modulation ratio of 17. (03)
- 5B. With the help of neat circuit schematic, draw the voltage across the resonant capacitor and (03) the current through the resonant inductor for a zero current switched buck converter.
- Discuss space vector pulse width modulation (SVPWM) technique with respect to a 3 pole 5C. (04) voltage source inverter. Mention use of null states in SVPWM technique.



Fig. Q1A

(03)

(04)