Code No: R1631025 **R16** SET - 1

III B. Tech I Semester Supplementary Examinations, May - 2019

POWER ELECTRONICS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	Why turn ON time is less than turn OFF time in SCR?	[2M]
	b)	What is active power input of single phase full converter at $\alpha = 60^0$?	[2M]
	c)	Give the conduction periods of diodes in in three phase semi converter for 60 Hz frequency with $\alpha = 30^0$?	[2M]
	d)	What is the principle operation of forward converter in CCM?	[3M]
	e)	What is the mechanism provided to prevent shoot through fault in VSI?	[3M]
	f)	Draw the waveforms of single phase half wave ac voltage controller with RL load with $\alpha = 30^0$?	[2M]

PART -B

2.	a)	Describe the switching characteristics of power MOSFET and IGBT and compare them?	[7M]
	b)	Draw the gate characteristics of a SCR and explain its importance in the design of gate drive circuit?	[7M]
3.	a)	Explain the operation of single phase full-wave controlled rectifier using center tapped transformer with R-L load under discontinuous mode of operation? Draw the waveforms of output voltage, voltage across SCR and average load current for $\alpha = 60^0$?	[7M]
	b)	A single phase half wave controlled rectifier without a freewheeling diode is connected to R load of 10 Ω. The converter is supplied from 230 V, 50 Hz ac supply (i) determine average and rms load voltage (ii) if inductive load is added to the resistive load such that R = 10 Ω and L = 6 mH, calculate new values of average and rms load voltages? Assume $\alpha = 30^0$.	[7M]
4.	a)	Describe the operation of three phase full converter with RL load? Draw the waveforms by choosing firing angle such that output voltage has negative part.	[7M]
	b)	A three phase semi converter is connected to a RL load with R=10 Ω. If the firing angle of SCR is $\alpha = 60^0$ and it feeds 4 kW power to a resistive load determine the amplitude of maximum per phase input voltage.	[7M]
5.	a)	Explain the operation of buck-boost converter in the CCM mode and obtain the expression for amplitude of ripple current.	[7M]
	b)	A buck converter has the input voltage of 220 V and it operates at 1 kHz, when the average load current is 50 A, the load resistance is 3 Ω. Determine the value of inductance to limit the maximum peak to peak ripple current through inductor to 10% and find the value of inductance for maximum ripple current?	[7M]
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6. a) How do you use PWM to inverters? Explain operation of single full bridge inverter with quasi-square wave pulse width modulation. [7M]
   b) Explain the working of auto sequential commutated current source inverter? [7M]

7. a) Explain four modes of operation of TRIAC and also state in which quadrant for which polarities of terminals it is more sensitive. [7M]
   b) A single phase ac voltage controller is connected with a load of R = 10 Ω with input voltage of 230 V, 50 Hz supply. If the firing angle of SCR is 90^0 calculate, rms value of output voltage, power delivered to load, average value of thyristor current and input power factor? [7M]

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