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Code No: R1631025			R16 SEI -		
		III B. Tech I Semester F (Ele	r Regular Examinations, October/November - 2018 POWER ELECTRONICS ctrical and Electronics Engineering)		
Ti	Time: 3 hours Max. Max				
		Note: 1. Question	Paper consists of two parts (Part-A and Part-B)		
		2. Answer A	ALL the question in Part-A any FOUR Questions from Part-B		
		5.7 Miswer a			
1		Drease the turn OFF of	PART -A	[2] /	
1.	a)	Draw the turn – OFF cr	haracteristics of SCR.		
	D)	continuous conduction.	ource inductance in fully controlled bridge rectifier with	[2M	
	c)	Draw the circuit diagram	m of a 3-phase full wave uncontrolled rectifier.	[2M	
	d)	Explain duty cycle in st	tep up chopper operation	[3M	
	e)	What is the principle of	f operation of Inverter?	[3M	
	f)	Compare turn off mech	anism of TRIAC and Thyristor	[2M	
			<u>PART –B</u>		
2.	a)	What is power MOSFI difference between gen	ET? What are the types of power MOSFET? Write the eral purpose MOSFET and power MOSFET?	[7M	
	b)	Describe the basic beha	avior of thyristor using a two- transistor model.	[7M	
3.		What is phase angl single – phase angle c output voltage. Draw th	le controlled technique? Explain the operation of ontrolled rectifier. Derive the expression for average dc ne relevant waveforms.	[14M	
4.		A three –phase full co supplied from a 220 V 30°, Draw the relevan ii) average output curre	private is connected to a load resistance of 5 Ω and it is α , 50 Hz ac supply, If the firing angle of thyristor is α = at waveforms and determine i) average output voltage, ant, iii) rms output voltage and iv) rms output current.	[14M	
5.	a)	Explain the operating p voltage and current w	principle of dc chopper with a suitable diagram. Draw the vaveforms of chopper. Derive expressions for average	[10M	
	b)	Discuss the principle of	f operation of Buck-Boost converter.	[4M	
6.	a)	Describe the V-I charac	cteristics of TRIAC and modes of operation.	[7M	
	b)	A single –phase half – $R = 5 \Omega$ with an input v 45° , determine i) RMS	-wave ac voltage controller is connected with a load of voltage of 230 V, 50 Hz. If the firing angle of thyristor is output voltage, ii) Power delivered to load	[7M	
7.	a)	What are pulse width techniques used in inve	n modulated inverters? What are the different PWM prter?	[7M	
	b)	With the help of a neat 3-phase bridge inverter	circuit diagram and waveforms, explain the operation of with R load.	[7M	



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(R16)



III B. Tech I Semester Regular Examinations, October/November - 2018 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 PART -A a) Explain the turn – ON and turn – OFF time of SCR. [2M] 1. b) Draw the 1-phase fully controlled rectifier circuit with freewheeling diode. [2M] c) In the case of a 3-phase, half controlled rectifier feeding a purely resistive load, if [2M] two values of the firing angle α are measured from the point of natural commutation are 20 and 40 degrees, then obtain the extinction angles measured from the origin. d) Draw the static V-I characteristics of TRIAC. [3M] e) List the advantages and disadvantages of Boost converter. [3M] Compare VSI and CSI. [2M] f) PART-B 2. a) Draw the V-I characteristics of a power MOSFET and explain different operating [7M] regions. b) Draw the V-I characteristics of SCR and explain it briefly? [7M] a) A single phase 220 V, 1 kW heater is connected to a half- wave controlled rectifier [10M] 3. and fed from a 220 V, 50 Hz ac supply, Determine the power absorbed by the heater when the firing angle is i) $\alpha = 30^{\circ}$ and ii) $\alpha = 90^{\circ}$. b) Write the advantage of freewheeling diode in single-phase half -wave controlled [4M] rectifier with RL load. Draw the circuit diagram of three – phase, half –wave controlled rectifier with R load 4. [14M] and explain its operating principle with voltage and current waveforms. Determine the following parameters for *R* load with firing angle $\alpha = 60^{\circ}$: i) dc output voltage ii) Average dc load current iii) rms output voltage iv) rms load current. 5. a) Explain the different control strategies in DC-DC circuits? [7M] b) Discuss the Principle of operation of forward and fly back converters in CCM. [7M] Describe working of 3-Phase AC-AC regulators with R load only and draw the 6. a) [7M] relevant waveforms. b) A single phase full –wave ac voltage controller is connected with a load of $R = 10 \Omega$, [7M] with an input voltage of 230 V, 50 Hz. When the firing angle of thyristors is 45°, determine i) power output at load, ii) average value of thyristor current and iii) rms value of thyristor current. 7. a) What is pulse width modulation? List the various PWM techniques. How do these [7M] differ from each other?

b) A single-phase PWM inverter is fed from a 220 V dc supply and it is connected to a [7M] RL load with R=10 ohms and L=10 mH. Determine the total harmonic distortion in the load current .Assume width of each pulse is $\pi/2$ and the output frequency is 50 Hz.



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SET - 3

III B. Tech I Semester Regular Examinations, October/November - 2018 POWER ELECTRONICS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

[2M]

[2M]

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**

PART -A

- 1. a) Compare Power MOSFET and IGBT.
 - b) What would be the input power factor in a 1-phase rectifier if extinction angle [2M] control is used for improving power factor with angle β is 50°
 - c) A 3-phase controlled rectifier feeds a purely resistive load. The data are Vs= 220V [2M] (rms) and R_{ld} = 15 ohms. If the firing angle α is 45° then what would be the duration of conduction of thyristor.
 - d) Discuss the time ratio control in a dc chopper [3M]
 - e) Draw the waveforms for 1-phase fully controlled ac regulator with inductive load. [3M]
 - f) Why a PWM inverter is superior to a square wave Inverter?

PART –B

- 2. a) Draw the switching characteristics of power MOSFETs. Define turn- ON delay time, [7M] rise time, turn ON time, turn- OFF delay time, fall time and turn- OFF time.
 - b) What are the different turning ON methods of a thyristor? Explain each method. [7M]
- 3. a) Draw the circuit diagram of a single phase full wave controlled rectifier using [7M] centre tap transformer with R load and find dc output voltage.
 - b) A single phase fully controlled bridge converter with RL load is supplied from 220 [7M]
 V, 50 Hz ac supply. If the firing angle is 45°, determine i) average output voltage, ii) output current iii) input power factor.
- 4. a) Draw the circuit diagram of a three phase bridge converter with *RL* load. Discuss [14M] its working principle. Draw the voltage and current waveforms. Determine the following parameters:
 i) dc output voltage ii) average dc load current iii) rms output voltage iv) rms load current .
- 5. With the help of a neat circuit diagram and associated waveforms, discuss the [14M] operation of Buck-Boost converter.
- 6. a) Draw the single phase bidirectional ac voltage controller with R load and explain its [7M] working principle with waveforms.
 - b) Draw the waveforms for 3-phase a.c voltage regulator for R load for firing angle 60° [7M]
- 7. Explain the working of TRIAC as voltage controller with R load and draw the [14M] relevant waveforms.



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SET - 4

III B. Tech I Semester Regular Examinations, October/November - 2018 **POWER ELECTRONICS**

(Electrical and Electronics Engineering)

Time: 3 hours

Code No: R1631025

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

PART -A

1.	a)	What is Sunbber circuit?	[2M]
	b)	In a 1-phase bridge type of controlled rectifier supplying RL load, under what conditions discontinuous conduction occurs.	[2M]
	c)	Draw a 3-phase half wave controlled converter circuit diagram and output voltage wave form for R load.	[2M]
	d)	List the advantages and disadvantages of Buck-Boost converter	[3M]
	e)	How shoot through fault will be prevented in VSI.	[3M]
	f)	What is meant by integrated cycle control	[2M]
		PART –B	
2.	a)	What is IGBT? What are the advantages of IGBT over power BJT and power MOSFET?	[7M]
	b)	Draw the V-I characteristics of a thyristor and explain different operating regions. What is the effect of Gate current on the V-I characteristics of a thyristor?	[7M]
3.	a)	What is the effect of source inductance in single $-$ phase full $-$ wave controlled bridge rectifier with <i>RL</i> load? (b) Draw the voltage and current waveforms	[10 M]
	b)	Explain how a free – wheeling diode improves power factor in a converter.	[4M]
4.		Draw the circuit diagram of 3 – phase half –wave controlled rectifier with <i>RL</i> load and explain its operating principle with voltage and current waveforms. Determine the following parameters for <i>RL</i> load with firing angle $\alpha = 30^{\circ}$: i) dc output voltage ii) Average dc load current iii) rms output voltage iv) rms load current v) Ripple factor	[14M]
5.		With help of neat circuit diagram and associated waveforms discuss the operation of a Buck converter in continuous conduction mode and discontinuous conduction mode.	[14M]
6.		Derive the expression for rms output voltage of bidirectional 1-phase ac voltage controller with RL load. And draw the relevant waveforms.	[14M]
7.		Explain the working of a 1-phase full bridge Inverter with RL load. Draw the relevant output waveforms.	[14M]
