SIDDHARTH GROUP OF INSTITUTIONS: PUTTUR

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Subject: POWER ELECTRONIC CONVERTERS(19EE2112) **Course& Branch**: M.Tech -PE

Year & Sem: I-M.Tech & II-Sem **Regulation:** R19

UNIT –I

THYRISTORS

1. Explain briefly about Silicon controlled Rectifiers. [12M]

2. What are the turn-off and turn-on characteristics of SCR? [12M]

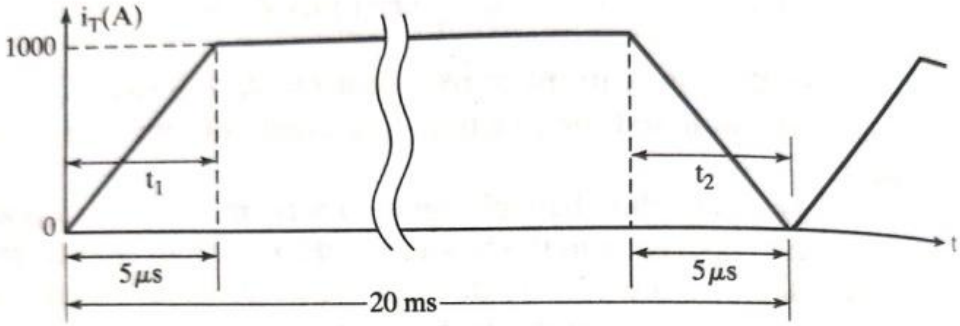
3. What are the output and transfer characteristics of IGBTs. [12M]

4. a) What is a bipolar transistor and what is the difference between SCR and BJT? [6M]

b) Explain about steady state characteristics of BJT with neat sketch. [6M]

5. a) What is the purpose of shunt snubber and series snubber in transistor? [6M]

b) A thyristor carries a current as shown in figure and the current pulse is repeated at a frequency of f_s=50hz.Determine the average on-state current I_T. [6M]



6. a) What are the turn-off and turn-on characteristics of MOSFET? [6M]

b) What is the switching model of n-channel MOSFET? [6M]

7. What is meant by commutation? Draw the line commutation and forced commutation circuit for Thyristors. [12M]

8. a) Draw and explain the turn-off and turn-on characteristics of MOSFET? [6M]

b) Two MOSFETs that are connected in parallel ,carry a total current of I_T=20A.The drain to source voltage of MOSFET M_1 is V_{DS1}=2.5V and that of MOSFET M_2 isV_{DS2}=3V.Determine the drain current of each transistor and difference in current sharing if the current sharing series resistances are a)R_{S1}=0.3 ohm and R_{S2}=0.2 ohm ,and b)R_{S1}=R_{S2}=0.5ohm. [6M]

9. Draw and Explain the dynamic characteristics of SCR? [12M]

10. a) Derive an expression for two transistor analogy of a thyristor and explain briefly. [6M]

b) Explain the construction of IGBT with neat diagram. [6M]

UNIT –II

SINGLE-PHASE &THREE-PHASE AC TO DC CONVERTER

1. Explain about single phase full converter with RL load. [12M]

2. Explain about three-phase dual converter. [12M]

3. a) What is the pulse-width-modulation control of converters? [6M]

b) The single phase full converter has a RL load having L=6.5mh,R=0.5 ohm,and E=10V.the input voltage Vs=120V at (rms) 60hz.Determine a)the load current I_{L0} at wt= $\alpha=60^0$ b)the average thyristor current, c)the rms thyristor current d) rms output current e) the critical delay angle. [6M]

4. Explain the principle of operation of phase-controlled converter. [12M]

5. Explain the principle of operation of three-phase half-wave converters. [12M]

6. How does a 12 pulse converter works? and draw the circuit . [12M]

7. State and explain different methods of control of converters. [12M]

8. Derive an output voltage equation for a three phase semi converter with neat circuit and waveforms. [12M]

9. a) The single phase dual converter is operated from a 120v,60hz supply and load resistance is R=10 ohm.The circulating inductance is Lr=40 mH,delay angles are $\alpha_1=60^0$ and $\alpha_2=120^0$.calculate the peak circulating current and the peak current of converter 1. [6M]

b) What are the extinction angle controls of converters? [6M]

10. a) Derive an expression for average output current for single phase full converter with RL-Load. [6M]

b) What are the reactive power considerations of ac-dc converters? [6M]

UNIT –III
DC-DC CONVERTERS

1. Explain the principle of step-down converter with RL-load. [12M]

2. Explain the principle and operation of the step-up converter with RL-load. [12M]

3. Classify the converters based on quadrant operation and explain in detail with neat diagrams. [12M]

4. Analyse the output voltage equation for operation of the step-up converter with neat circuit diagram. [12M]

5. a) What is a dc-dc converter? [6M]

b) Derive an output voltage equation for a step down converter. [6M]

6.	Explain the principle and operation of Buck converter.	[12M]
7.	With neat circuit diagram and waveforms explain the principle and operation of the Boost converter.	[12M]
8.	Draw the waveforms for operation of the Buck-Boost converter and explain.	[12M]
9.	With neat circuit diagram and waveform explain the principle and operation of the cuk converter.	[12M]
10.	Explain three phase controlled converters with neat sketch.	[12M]

UNIT –IV
SINGLE-PHASE INVERTERS

1.	Explain the principle of the Three-Phase bridge Inverter with neat circuit diagram and waveforms	[12M]
2.	a) Classify the inverters based on different aspects.	[6M]
	b) What is the difference between half-bridge and full-bridge inverters?	[6M]
3.	Explain the principle and operation of the Voltage source inverters.	[12M]
4.	Draw the waveforms for three-phase current source inverter and explain in detail.	[12M]
5.	Explain the principle and operation of the current source inverters.	[12M]
6.	Draw the waveforms for three-phase inverter when each transistor conducts for120º.	[12M]
7.	What are the techniques used for harmonic reductions in inverters?	[12M]
8.	Evaluate the voltage control of Three-Phase inverters?	[12M]
9.	Explain briefly about difference between space vector modulation and PWM technique.	[12M]
10.	Compare the different types of modulation techniques used in inverters.	[12M]

UNIT –V
THREE PHASE INVERTERS

1.	Explain the principle of the Three-Phase Inverter.	[12M]
2.	a) What are the types of inverters? explain in detail.	[6M]
	b) What is the difference between single-Phase and Three-Phase inverters?	[6M]
3.	With neat circuit diagram explain the principle and operation of the series inverters.	[12M]
4.	Explain the operation of single-phase inverter and draw the waveforms?	[12M]
5.	What is parallel inverter ? and explain the operation with neat waveforms.	[12M]
6.	Draw the waveforms for three-phase inverter when each transistor conducts for 180º.	[12M]
7.	What are the voltage control techniques of three-phase inverters?	[12M]

8. Draw the waveforms for three-phase inverter when each thyristor conducts for 120º. [12M]
9. Explain briefly about difference between voltage control and PWM technique. [12M]
10. Explain the Pulse width modulation techniques used in inverters [12M]

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