APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

6212 –April17- 1 (Pages: 3) Name .....

Reg. No: .....

SECOND SEMESTER M.TECH. DEGREE EXAMINATION APRIL 2017

Branch: Electrical Engineering **Specialization: Power Electronics**

08EE 6212 ANALYSIS OF POWER ELECTRONIC CIRCUITS -II

Time:3 hours **Max.marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

(graph sheets can be provided)

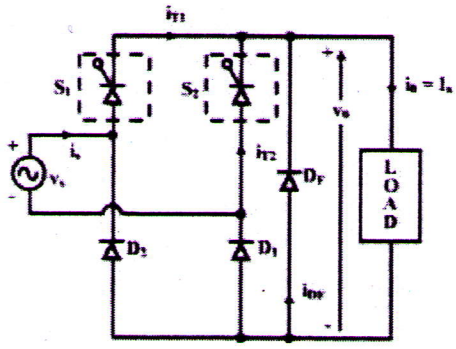
Module 1

Q.no.		Marks
1.a	What is the necessity for output voltage control of inverters? List different methods available for it with its merits and demerits	3
	Answer b or c	
b	(i) Define modulation index and give its significance.	6
	(ii)With neat sketches explain Sinusoidal Pulse Width Modulation and obtain an expression for RMS output voltage produced. Why a modified method is to be suggested? (1+5=6)	
c	Describe space vector modulation technique and why it is said to be superior compared to other PWM methods.	6

Module 2

Q.no.		Marks
2.a	Define power factor and displacement power factor. What are the reasons for low power factor and list the benefits of power factor improvement?	3
	Answer b or c	

b. 6



The single phase semi converter shown in figure is operated from a 120V,60Hz supply. The load current I_a can be assumed to be continuous and its ripple content is negligible. The turns ratio of the transformer is unity If the delay angle is $\pi/2$, calculate the harmonic factor of input current and the input power factor.

c (i)What is forced commutation technique? What are its features? 6

(ii) Give the classification and the basic topologies of force commutated PWM rectifiers and explain them listing their advantages. (2+4)

Q.no.	Module 3	Marks
3.a	Draw the circuit of two single phase semi converters connected in series with a highly inductive load and obtain the expression for normalised average output voltage.	3

Answer b or c

b	Explain with neat figures and equations how it is possible to stepped up and down the output voltage of a z-source inverter ? .	6
c	(i)Write a note on need for higher pulse converters.	(6)
	(ii)Prove that in a 12 pulse converter output contains only higher order harmonics. (1+5)	

Q.no.	Module 4	Marks
4.a	(i) Multilevel inverters are well suited for reactive power compensation- Give reasons.	3
	(ii)Write a note on PWM techniques for multi level inverters. (2+1)	

Answer b or c

b	Draw the schematic diagram of a five level single phase flying capacitor type inverter and give its principle of operation . List its main features, advantages and disadvantages.	6

c (i)Draw the phase and fundamental waveforms of a five level inverter . 6

(ii) With neat figures and waveforms explain the working of cascaded multi level inverter .Compare it with diode clamped inverter?. (1+5)

Q.no.	Module 5	Marks
5.a	(i) Explain the conventional hysteresis current controller with suitable diagrams (ii) Define and give the concept of 'modulation and modulation index in PWM systems. (2+2)	4

Answer b or c

b (i)What is closed loop current control ? How it differs from open loop open loop controllers? Give its classification. (3) 8

(ii)What is a bang bang controller? (2)

(iii)How modulation in multilevel inverters can be achieved through hysteresis current controllers? List its limitations if any. (3)

c (i) Draw and explain the general block diagram of a current controlled voltage source PWM verter and mention its advantages over voltage controlled methods. 8

(ii) Why constant switching frequency control is preferred in multi level inverters? List and describe methods for achieving constant switching frequency control of multi level inverters. (3+5)

Q.no.	Module 6	Marks
6.a	What is a matrix converter? Give its topology with switching arrangement? Why its practical applications are said to be limited?	4

Answer b or c

b (i)Comment on input power factor of matrix converters. 8

(ii)Explain venturini control method for matrix converters. (2+6)

c (i) How a matrix converters can be modelled ? 8

(ii) Write a note on current commutation of matrix converters.

(iii) Describe bidirectional switch realization in matrix converters. (3+3+2)