

**APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER**

08EE6212-1-April18

(Pages: 3)

Name:

Reg. No:

SECOND SEMESTER M.TECH. DEGREE EXAMINATION APRIL 2018

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)

Q.no.	Module 1	Marks
1.a	(i) Define the basic theorem behind PWM techniques. List any four fundamental methods for generating PWM signals.	3

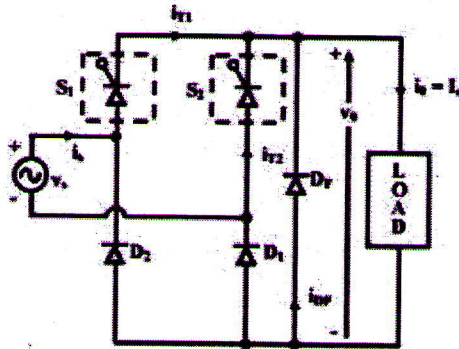
Answer b or c

- | | | | |
|---|---|-----|---|
| b | (i)What is the necessity for output voltage control of inverters? | (1) | 6 |
| | (ii)Define space vector and explain the method of realizing an arbitrary voltage from two boundary vectors through space vector PWM Techniques. | (5) | |
| c | (i)Give the classification of conventional sampling PWM techniques. | (1) | 6 |
| | (ii)With neat graphs explain PWM with bipolar and unipolar switching and discuss about the average output voltage produced through them. | (5) | |

Q.no.	Module 2	Marks
2.a	Define power factor and differentiate it from displacement power factor. List the benefits of power factor improvement?	3

Answer b or c

- | | | | |
|---|---|-----|---|
| b | (i)What is forced commutation technique? What are its features? | (2) | |
| | (ii) 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 by deriving the expression for the parameters. | (4) | 6 |



- c (i) Give the general classification of PWM rectifiers. (1) 6
- (ii) Describe the power circuit and working principle of three phase voltage source rectifiers. Also discuss its control schemes. (5)

Q.no.	Module 3	Marks
3.a	(i) Write a note on higher pulse converters. (2)	3
	(ii) Draw the circuit of two single phase semi converters connected in series with a highly inductive load. (1)	

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) What is meant by sequence control of series connected converters? Illustrate. (3) 6
- (ii) Prove that in a 12 pulse converter output contains only higher order voltage harmonics. (3)

Q.no.	Module 4	Marks
4.a	Define reactive power and justify the statement "Multilevel inverters are well suited for reactive power compensation".	3

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) Prove that a multi level inverter voltage increases with number of steps. (1) 6
(ii) With neat figures and waveforms explain the working of improved diode clamped inverter. Compare it with diode clamped inverter?. (5)

Q.no. Module 5 Marks

- 5.a (i) Describe conventional hysteresis current controller with its advantages.(3) 4
(ii)Justify role of modulation index in PWM systems. (1)

Answer b or c

- b (i) Define and explain hysteresis current controllers with fixed band through neat sketches. List their applications. (5) 8
(ii)Describe closed loop current control of power electronic systems?? Give its classification and merits. (3)
- c (i)Draw the general block diagram of a current controlled voltage source PWM inverters and mention its advantages over voltage controlled methods. (3) 8
(ii) Discuss current regulation of Voltage source inverters. ? Draw the block diagram of a linear current controlled PWM inverter and describe it. (5)

Q.no. Module 6 Marks

- 6.a What is a matrix converter? Compare it with conventional converters. Why its practical applications are said to be limited? 4

Answer b or c

- b (i)Write short note on modulation and control strategies of matrix converters. (2) 8
(ii) Explain venturini control method for matrix converters. (6)
- c (i)Write note on current commutation of matrix converters. (4) 8
(ii)Describe bidirectional switch realization in matrix converters. (4)