APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code: 0822212-I **(Pages: 2)** **Name:** .....

Reg. No: .....

SECOND SEMESTER M.TECH. DEGREE EXAMINATION, JULY 2022

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

08EE6212 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.

Q.no.	Module 1	Marks
1.a	Compare sinusoidal PWM and space vector PWM	3
	Answer b or c	
b	Explain about trapezoidal modulation and staircase modulation	6
c	A single phase full bridge inverter with R load has input DC voltage Vs=200V and uniform pulse width modulation with six pulses per half cycle is used, the width of each pulse is 30°. Calculate the rms voltage of the load. If the pulse width is increased by 20%, determine the pulse width for the same load power.	6

Q.no.	Module 2	Marks
2.a	Describe the extinction angle control for power factor improvement.	3
	Answer b or c	
b	A single phase converter is operated in symmetrical angle control. The load current with an average value of Ia is continuous where the ripple content is negligible. Calculate the average output voltage, Vdc and RMS output voltage, Vrms when $\beta = \pi/6$ and the peak input voltage is 189.83 V.	6
c	Derive the Fourier series expression of input current of PWM controlled single phase semi converter with R load.	6

Q.no.	Module 3	Marks
3.a	Analyse the simple boost control of Z-source inverter with necessary figures.	3
	Answer b or c	
b	Explain the principle of working of twelve pulse converters.	6

c	A single phase full converter with RLE load uses delay angle control and is supplied with 110V, 50 Hz supply. Determine the rms value of lowest order harmonic current in the load if delay angle $\alpha=\pi/3$, E=10V, L=10mH and R=15Ω.	6

Q.no.	Module 4	Marks
4.a	Explain the circuit for single phase cascaded H bridge multilevel inverter and draw the output waveform of 9 level phase voltage.	3
	Answer b or c	
b	Draw the circuit of a single phase five level flying capacitor multilevel inverter and derive the output phase voltages for various switching states of devices.	6
c	How multilevel converters can be used for reactive power compensation?	6

Q.no.	Module 5	Marks
5.a	Explain about fixed-band variable frequency hysteresis current control.	4
	Answer b or c	
b	Derive the equation for switching frequency in hysteresis current controlled closed loop voltage source inverter.	8
c	Describe the improved hysteresis regulator with completely independent window limits.	8

Q.no.	Module 6	Marks
6.a	What is the need for input filter in matrix converter? What are the different types of input filters used in matrix converters?	4
	Answer b or c	
b	Describe the direct and indirect matrix converter with necessary figures.	8
c	Determine modulation matrix and explain the Venturini control of matrix converter.	8