

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

**B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY
2025**

Sixth Semester

Electrical and Electronics Engineering

EE3011 – Multilevel Power Converters

Regulations - 2021

Duration : 3 Hrs

Maximum: 100 Marks

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	What is a generalized topology in power electronics?	L1	1	2
2.	Outline the importance of a common DC bus in a converter topology.	L1	1	2
3.	List the main components of an H-Bridge inverter.	L1	2	2
4.	Rephrase the concept of pulse width modulation in inverter applications.	L2	2	2
5.	Interpret the functional role and significance of modulation in multilevel converters.	L2	3	2
6.	State the meaning of 'effectiveness boundary' in voltage balancing.	L1	3	2
7.	Describe the modulation scheme used for FCMC.	L2	4	2
8.	Mention the advantage of using a flying capacitor topology.	L1	4	2
9.	Classify the advantages of reduced switch count in multilevel inverters based on design, cost and performance.	L2	5	2
10.	What is the purpose of reducing the switch count in a multilevel inverter?	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11.	a Explain in detail the structure and characteristics of symmetric topology without a common DC link. List its advantages and applications.	L2	1	16
	Or			
	b Describe the concept and working principle of asymmetric topology in power converters.	L2	1	16
12.	a Draw and explain the working of a Cascaded H-Bridge (CHB)	L3	2	16

inverter using equal DC voltage sources. Apply your understanding to analyze the output voltage levels, switching strategy and benefits of this topology in multilevel inverter applications.

Or

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|-----|-----|---|----|---|----|
| | b i | Develop and explain the concept of phase-shifted multicarrier modulation used in multilevel inverters. | L3 | 2 | 8 |
| | ii | Apply your understanding to illustrate the working of phase-shifted and level-shifted PWM techniques. Explain how staircase modulation is implemented in multilevel inverter. | L3 | 2 | 8 |
| 13. | a | Analyze the structure and functional operation of multilevel converters. Discuss various modulation strategies used in multilevel converters. | L4 | 3 | 16 |
| | | Or | | | |
| | b | Examine diode clamped multilevel converter topologies based on structural design, modulation techniques and overall performance. | L4 | 3 | 16 |
| 14. | a | Summarize the structure and operation of the Flying Capacitor Multilevel Converter. | L2 | 4 | 16 |
| | | Or | | | |
| | b | Demonstrate an understanding of dynamic voltage balancing in Flying Capacitor Multilevel Converters. | L2 | 4 | 16 |
| 15. | a | Evaluate the structure and working principles of multilevel inverters with reduced switch count. | L5 | 5 | 16 |
| | | Or | | | |
| | b | Determine the various pulse generation methods used in multilevel inverters. | L5 | 5 | 16 |