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INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

M.Tech I Semester End Examinations (Regular) - February, 2017

Regulation: IARE-R16

MULTI LEVEL INVERTERS
(Power Electronics and Electric Drives)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

- Explain the principle of operation of a single phase full bridge inverter circuit with the help of a neat circuit diagram and necessary waveforms. [7M]
 - A single phase full bridge inverter is operated from a 48V battery and is supplying power to a pure resistive load of 10Ω . Determine [7M]
 - The fundamental output voltage and first five harmonics
 - RMS value by direct integration method,
 - Output power
- What is meant by Pulse Width Modulation. Explain any two modulation techniques for an inverter circuit. [7M]
 - What is the function of a drive circuit. Explain about an Optocoupler isolated drive circuit suitable for IGBT's and MOSFET. [7M]

UNIT – II

- Explain the concept of Multilevel Inverters. [7M]
 - Explain the effect of Multilevel operation on the harmonic content and switching stress. [7M]
- Explain the principle of operation of SVPWM technique in linear modulation region. [7M]
 - What are the various topologies of Multilevel inverters. Explain the advantage of each type. [7M]

UNIT – III

- Explain the principle of operation of a cascaded Multilevel Inverter with a neat circuit diagram. [7M]
 - Consider the output phase voltage waveform for $m=6$ (including 0-level) cascaded MLI, find the generalized Fourier series of the phase voltage waveform obtained. [7M]
- Distinguish between NPC and Cascaded H-bridge Multi level inverters. [7M]
 - Describe how high level inverters can be constructed employing capacitors and compare its cost and reliability aspects. [7M]

UNIT – IV

7. (a) Explain the principle of operation of a flying capacitor MLI. [7M]
(b) Explain about a generalized MLI topology with self voltage balancing. [7M]
8. (a) Explain the cascading of two level inverter concept. [7M]
(b) Explain about a higher level inverter by using an open end induction machine with MLI on each side. [7M]

UNIT – V

9. (a) Explain about the issues in capacitor voltage Balancing. [7M]
(b) What are hybrid inverters. List the latest topologies available in MLI configurations. [7M]
10. (a) Explain the principle of operation of a 12 sided polygon voltage space vector generation with step by step procedure for generating space vectors. [7M]
(b) What is meant by common mode voltage. Explain any method to eliminate such a voltage in an induction motor drive. [7M]