Exam. Code: 0937
Sub. Code: 6991

1128

B.E. (Electrical and Electronics Engineering)
Seventh Semester
EE-710: Power Electronics and Drives

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

Q.No. 1 (i) What is the control range of firing angle in ac voltage controller with RL load?

(ii)What are the disadvantages of the harmonic present in the inverter system?
(iii) What do you mean by DC bus voltage unbalancing problem that occurs in diode clamped multilevel inverter?

(iv)What is meant by step down cyclo-converters? Also explain the meaning of negative converter group in a cyclo-converter.

(v) What do you mean by two quadrant and four quadrant chopper drive? (5× 2 = 10)

Part - A

Q.No.2. (a) Explain the operation of a three phase bidirectional delta connected controller with suitable circuit diagram and waveforms. (5)

(b) A single phase full wave controller has an input voltage of 120 V rms and a load resistance of 6 Ω. The firing angle of thyristor is π/2. Find:

(i) RMS output voltage
(ii) Power output
(iii) Input power factor
(iv) Average and RMS thyristor current (5)

Q.No.3. (a) Explain the operation of a single phase full bridge inverter. Draw waveshapes of output current, when load is purely inductive. (5)

(b) A single phase fully controlled converter is connected to a load comprised of 2 ohms resistance and 0.3 H inductance. The supply voltage is 230 V at 50 Hz. Estimate the average load voltage, average load current and input power factor for a firing angle of 20°. Assume continuous and ripple free load current. Draw load voltage waveform. (5)

Q.No.4. (a) What do you mean by a MLI? What are the various topologies used for a MLI? Explain any one topology in detail. (6)

(b) Explain the working of a current source inverter. (4)

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Part - B

Q.No.5. (a) Discuss the operation of a single phase cyclo converter with relevant circuit diagram and necessary output waveforms. (6)

(b) Give some industrial applications of a cycloconverter. (4)

Q.No.6. (a) What are the conditions to be satisfied for regenerative braking operation? (3)

(b) Explain the operation of four quadrant DC drives using chopper with necessary diagram. (4)

(c) Why the stator voltage control of induction motor is suitable for low power rating and narrow speed range? (3)

Q.No.7. (a) A three phase 400 V, 15 kW, 1440 rpm, 50 Hz star connected induction motor has rotor leakage impedance of $0.4 + j1.6$, stator leakage impedance and rotational losses are assumed negligible. If this motor is energized from 120 Hz, 400 V three phase source then calculate the motor speed at rated load. (6)

(b) Explain the principle of stator voltage control of induction motor. (4)

x-x-x