Exam. Code: 0937
Sub. Code: 33783

2124

B.E. (Electrical and Electronics Engineering)
Seventh Semester
PC-EE-701: Power Electronics and Drives

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

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

1. (i) Draw a 3-phase to 1-phase CC using 36 SCRs for non-isolated load phases. (2)
(ii) A single-phase Voltage controller fed from 230V,50 hz is connected to R=15Ω.For 6 on-cycles and 4 off-cycles, calculate rms output voltage. (2)
(iii) What is the main drawback of single-phase half bridge inverter and how it is overcome? (2)
(iv) Sketch an output voltage of inverter as obtained when zero of carrier sinusoidal wave coinciding with zero of the reference square wave. (2)
(v) Draw block diagram for one technique which can be used for external dc input voltage control of inverters. (2)

PART-A (Attempt any two)

2. (i) Draw a neat circuit diagram of 2-stage sequence control of Voltage Controllers for R-load. Choose a triggering sequence and explain its working. Also draw appropriate waveforms for output voltage and current clearly marking the sequence of triggering of SCRs for R load. (5)
(ii) For a three phase CC that accepts 230 V/50 hz supply, draw its schematic diagram and fabricate a single phase output voltage waveform from it with reduction factor of 1/4 th. Clearly indicate the sequence of triggering of SCRs. (5)

3. (i) For three-phase ,3-L flying capacitor MLI, draw its switching table to obtain different levels of output. For 'n' level Flying MLI , explain how many switches and capacitors will be required per phase. (5)
(ii) The speed of a separately excited dc motor is controlled by means of a three-phase semi-converter from a three phase,415 V,50 hz supply. The motor constants are inductance 10 mH, resistance 0.9 ohms and armature constant 1.5 V/rad/s(Nm/A). Calculate the speed of this motor at a torque of 50 Nm when the converter is fired at 45 degrees. (5)

4. (i) Showing the type of converters used for running a single-phase full converter dc drive. Write the equations for Vt and Vf as applicable for this drive, draw the output voltage waveforms for armature and field and specify its quadrant of operation. (5)
(ii) For a case of a single-phase bridge inverter feeding a RLC overdamped load circuit, draw its circuit diagram, explain its working and draw the relevant waveforms for output voltage and current. (5)

PART- B (Attempt any two)

5. (i) Explain the working of single-phase bridge cycloconverter working in step-up mode for continuous current conduction mode. (5)
(ii) A single-phase half wave AC Voltage Controller feeds a load of R=20Ω with input voltage of 230 V,50 Hz. Firing angle of thyristor is 45 degrees. Determine (a) rms value of output voltage(b) power delivered to load and input p.f.(c) average output voltage. (5)

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6. (i) State the advantage of DC Link Static Scherbius Drive over other drives used for Induction motors. Explain its operation to obtain sub-synchronous and super-synchronous speed of Induction Motors. (5)

(ii) Draw the circuit of a single-phase full converter drive for dc motors. Draw the relevant waveforms for input armature and field voltages fed to dc motors and the currents. Also drive the expressions for average output voltages. (5)

7. Describe modified McMurray Bed-forth Half Bridge Inverter with appropriate voltage and current waveforms. The total commutation interval may be sub-divided into certain well-defined modes for the purpose of explaining its operation. (10)