Exam. Code: 0937
Sub. Code: 33791

2124

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. 1 (Part-A) which is compulsory and selecting two questions each from Part B-C.

x-x-x

PART-A

1

I. Draw a single phase to single phase bridge cycloconverter configuration which can be utilized for step-up of input frequency. (2)

II. Draw any technique to obtain external control of ac output voltage for an inverter. (2)

III. Draw the circuit of two-phase, three level diode clamped MLI. (2)

IV. Why continuous or pulse gating is required in ac voltage controllers while feeding inductive loads? (2)

V. Induction motor speed control with constant-supply voltage and reduced-supply frequency is rarely used in practice. Justify this statement. (2)

PART-B

2. (a) Explain how DC Link Static Scherbius Drive is operated to obtain slip- recovery in case of Induction Motor Drive. (5)
(b) Explain the working of a Regenerative Chopper based DC Drive. (5)

3. (a) For a resistive load, draw a neat circuit diagram of a three phase Voltage Controller, explain the working and draw the waveform for output voltage and current. (6)
(b) Draw the configuration for single-phase 5 level H-bridge MLI. Write the switching states to obtain 5 levels of output voltages from it. (4)

4. (a) For a three phase to single phase CC that accepts 230 V/50 hz supply , draw its schematic diagram, explain the sequence of triggering of SCRs for obtaining single phase output voltage at $1/4^{th}$ of input Hz. Also draw the output voltage and current waveform as obtained in this case. (6)
(b) Draw a single-pulse modulated waveform obtained from a inverter operated in PWM mode hence give the fourier analysis of its output voltage and derive the expression for V_{onm}/V_{on1}(i.e output voltage for nth harmonic and fundamental harmonic). (4)

PART-C

5. (a) Discuss the principles of working of a three-phase bridge inverter with an appropriate circuit diagram. Draw phase and line voltage waveforms on assumption that each thyristor conducts for 120 degree with resistive load connected in star. Also indicate the sequence of firing of various SCRs. (6)
(b) Explain 'static rotor resistance control' method as applicable for Induction motor drives. Also show the plot for T-S as rotor resistance is varied. (4)

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6. (a) For a single phase parallel inverter, draw its circuit diagram, the output waveform for current, voltage and input voltage waveform. (6)

(b) Draw the circuit diagram of Single-Phase Bridge Cyclo-converter . Explain its working in step-up mode for continuous current conduction mode. (4)

7. (a)Draw the electric drive that works on controlling the stator voltage of induction motor and explain its operation with help of proper waveforms. (5)

(b) A 220V,60 A dc series motor having combined resistance of armature and field of 0.15 ohms is controlled in regenerative braking mode. The dc source voltage is 220V.Motor constant is 0.05 V-s/A.rad. The average motor armature current is rated and ripple free. For a duty cycle of 50% determine the power returned to the supply and speed during regenerative braking. (5)

x-x-x