Roll No.....

National Institute of Technology Delhi

Make Up Examinations 2017

Name of Specialization: Electrical & Electronics Engg Year: Third Semester: VI

Course Name: Power Electronics **Maximum Marks – 50**

Course Code: EE-352 **Total Time: 3:00 Hours**

Note:

- All Questions are compulsory.
- Do not write irrelevant theory and draw neat waveforms and circuit diagrams.
- Assume data where ever required.
- Questions are to be attempted in proper sequence otherwise it will not be evaluated.

Section A (*01 mark each and all parts are compulsory*)

Q1) Define cycloconverter. (1)

Q2) Explain THD for an inverter system. (1)

Q3) Discuss how distortion factor related to THD. (1)

Q4) Define converter. (1)

Q5) Draw the circuit diagram of single phase half bridge VSI. (1)

Q6) Briefly explain the principle of chopper operation. (1)

Q7) The per unit ripple in the load current is maximum when the duty cycle is equal to _____ (1)

Q8) Make a list of uncontrolled and controlled switches. (1)

Q9) Draw the block diagram of a typical power electronic system. (1)

Q10) To turn-OFF, a thyristor the anode current must be bring below_____current. (1)

Section B (*Any four (04) are to be attempted*)

Q11) Describe the operating principle of single phase to single phase step up cycloconverter with the help of bridge type configurations. Illustrate your answer with appropriate circuit and waveforms. The conduction of various thyristors must also be indicated on the waveforms. (5)

Q12) What is meant by step-up chopper? Explain its operation. Sketch the input voltage, input current, output voltage and output current waveforms. State the various assumptions made. (5)

Q13) A single-phase asymmetrical semiconverter is connected to RL load. Discuss its working. Illustrate your answer with waveforms of source voltage, output voltage, output current, thyristor current, source current & voltage across thyristor. (5)

Q14) Discuss the two-transistor model of a thyristor. Derive an expression for the anode current. (5)

Q15) Discuss the various types of power electronics converters. (5)

Section C (*Any two (02) are to be attempted*)

Q16) (a) A single-phase full bridge inverter may be connected to a load consisting of (i) *R* (ii) *RL* (iii) *RLC* overdamped (iv) *RLC* underdamped. For all these loads, draw the load current waveforms under steady operating conditions. Discuss the nature of these waveforms. (5)

(b) What is a multiphase chopper? Bring out clearly, with appropriate waveforms, the difference between the in-phase operation and phase-shifted operation of a multiphase chopper. Hence show why phase-shifted operation is preferred. Enumerate the merits and demerits of multiphase choppers. (5)

Q17) Discuss the principle of working of a three-phase bridge inverter with an appropriate circuit diagram. Draw and explain phase and line voltage waveforms on the assumption that each thyristor conducts for 180^0 . The sequence of firing of various SCRs should also be indicated in the diagram. (10)

Q18)(a) Describe the principle of dc chopper operation with the help of circuit diagram and waveform. Derive the expression of its average output voltage. (5)

(b) Discuss the principle of phase control in single-phase full wave ac voltage controller with the help of necessary waveforms and circuit diagram. (5)