National Institute of Technology Hamirpur (HP)

[End Semester Theory Examination, May 2023]

Branch: Electrical Engineering   Semester: IV
Subject: Power Electronics   Code: EE-223
Time: 3:00 Hours   Maximum marks: 50

Note:*Answer all the questions*
Any missing data may be assumed suitably giving proper justification.

Q1. Write any three of the following: [4x3]

   a) Explain the Principal & working of a Step Down Chopper with neat circuit diagram.
   b) Explain the working of the boost converter with a neat waveform and derive the peak-to-peak voltage across the capacitor.
   c) Explain the primary circuit and waveform and Mode of operation of the Buck-boost converter?
   d) Write any 04 applications of Choppers?

Q2. Write brief notes on any four of the following: [3x4]
   (a) How does Harmonic get created with a power electronics circuit write any two Methods of Reduction of Harmonic Content.
   (b) Define the Total harmonic distortion?
   (c) Explain I-V characteristics of a GTO.
   (d) Define modulation index and its use.
   (e) What is effect of source inductance in 1 phase rectifier circuits?

Q3. **(a) What is meant by an AC Chopper?**   [1]

   (b) Explain briefly about a Step-up Cyclo-converter with appropriate waveform   [3]

   (c) What are advantages and disadvantages of the AC voltage controller?   [3]

                        " OR "

   (c) Explain Bridge-type Cyclo-converters with waveform

Q4. Write brief notes on any two of the following: [3.5x2]

   a) Explain the Operation of SMPS.
   b) Integral cycle control
   c) Phase Angle control
   d) UPS

Q5. Explain the operation of any three of the following with neat diagram and waveform [3x4]

   a) Three-phase 180° Conduction of three-phase inverter. Also, obtain the expression for the RMS value of output voltage
   b) Three-phase 120° Conduction of three-phase inverter. Also, obtain the expression for the RMS value of output voltage
   c) What is PWM control for switching a single-phase inverter?
   d) What is the difference between VSI and CSI?