DEC-25-0048

EEPC-412 (Power Electronics)

B.Tech.-4th NEP

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note: Attempt five questions in all, select one question each from section A, B, C, D. Section E (Question-9) is compulsory.

SECTION - A

1. Explain the working and characteristics of Diode, Thyristor, MOSFET, and IGBT in power switching applications. (12)

OR

2. Describe voltage and current commutation of a thyristor with proper waveforms. (12)

SECTION - B

3. Explain the working of a single-phase half-wave and full-wave rectifier with R-load. (12)

OR

4. Discuss the operation of a three-phase full-bridge rectifier with waveforms. (12)

SECTION - C

5. Explain the working of a DC-DC boost converter with proper circuit diagram. (12)

OR

6. Explain the working of a buck converter with a circuit diagram and derive the output voltage expression. (12)

SECTION - D

7. Derive the expression for average output voltage in a three-phase inverter. (12)

OR

8. Explain the concept of switch states in three-phase inverters and explain the working of a single-phase voltage source inverter with circuit diagram and waveforms. (12)

SECTION-E (Compulsory)

9. (i) Define the term "commutation" in thyristors.

   (ii) Define "holding current" and "latching current" in an SCR.

   (iii) What are the advantages of using a three-phase rectifier over a single-phase rectifier?

   (iv) Why is an inductor used in a boost converter?

   (v) What is the advantage of sinusoidal PWM over square wave operation?

   (vi) Define the term "modulation index" in PWM inverters. (6×2=12)