

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER- VII EXAMINATION – SUMMER 2026****Subject Code:3170906****Date:29-05-2026****Subject Name: Advanced Power Electronics****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

|            |                                                                                                                               | Marks |
|------------|-------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Q.1</b> | (a) What is the need of Resonant Converter? Give classification of resonant converter.                                        | 03    |
|            | (b) Classify career based PWM technique for multilevel inverter. Discuss any one in brief.                                    | 04    |
|            | (c) Draw necessary waveforms and explain working of Boost converter in continuous and discontinuous conduction mode.          | 07    |
| <b>Q.2</b> | (a) Explain the need of reactive power compensation.                                                                          | 03    |
|            | (b) Compare HVDC transmission over HVAC transmission based on Economics of Transmission, Technical Performance & Reliability  | 04    |
|            | (c) Draw the circuit diagram of 5 level diode clamped multi level inverter and explain the operation with switching table     | 07    |
|            | OR                                                                                                                            |       |
|            | (c) Draw the circuit diagram of 5 level cascaded H-bridge multi-level inverter and explain the operation with switching table | 07    |
| <b>Q.3</b> | (a) Draw only the circuit diagram of flyback, forward and full bridge converter                                               | 03    |
|            | (b) Explain Multi output switch mode regulator with help of circuit diagram.                                                  | 04    |
|            | (c) Explain principle of series compensation. Discuss static synchronous series compensator.                                  | 07    |
|            | OR                                                                                                                            |       |
| <b>Q.3</b> | (a) Give comparison of SVC and STATCOM                                                                                        | 03    |
|            | (b) Explain working principal of UPFC                                                                                         | 04    |
|            | (c) Describe Cuk converter with circuit diagram and necessary waveform.                                                       | 07    |
| <b>Q.4</b> | (a) Draw only circuit diagram of Zero current switching DC-DC converter and Clamped Voltage topology                          | 03    |
|            | (b) Illustrate the push pull converter with neat circuit diagram & waveform                                                   | 04    |
|            | (c) Explain TCR with circuit diagram. Draw current and voltage waveforms for different values of $\alpha$ .                   | 07    |
|            | OR                                                                                                                            |       |
| <b>Q.4</b> | (a) Compare Linear voltage regulator and Switch mode regulator                                                                | 03    |
|            | (b) Define FACTS. State the advantages of FACTS devices                                                                       | 04    |
|            | (c) Justify the name of converter as zero voltage switching converter with necessary diagram and waveform                     | 07    |
| <b>Q.5</b> | (a) Give classification and applications of phase shifting transformer                                                        | 03    |

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|-----|------------------------------------------------------------------------------------------------------------------------|----|
| (b) | Explain concept of multi pulse converter. State advantages and disadvantages of multi-pulse converters.                | 04 |
| (c) | Draw block diagram of HVDC transmission system. Discuss equipment required for HVDC system and give their significance | 07 |

OR

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|------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Q.5</b> | (a) | Discuss control of HVDC system                                                                                                                     | 03 |
|            | (b) | Give comparison between ZCS and ZVS                                                                                                                | 04 |
|            | (c) | Which harmonics are dominant in line for a 12-pulse multi-pulse converter? Also, explain how harmonic cancellation occurs in multi-pulse converter | 07 |

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