

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- VII (New) EXAMINATION – WINTER 2019

Subject Code: 2170906

Date: 23/11/2019

Subject Name: Advanced Power Electronics

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) With block diagram Compare Linear voltage regulator and Switch mode voltage regulator. **03**
 (b) Compare HVDC transmission over EHVAC transmission based on Economics of Transmission, Technical Performance & Reliability **04**
 (c) With neat circuit diagram & waveform explain the operation of a BOOST converter in CCM and Derive the equation of (1) Peak to Peak Inductor Current (2) Peak to Peak Capacitor Voltage (3) Critical value of inductor & Capacitor. **07**
- Q.2** (a) What is the need of Resonant Converter? Compare Series Loaded Resonant (SLR) converter with Parallel loaded resonant (PLR) Converter **03**
 (b) Explain the operation of FORWARD Converter in Continuous Current Mode. Derive the Equation of Output Voltage. **04**
 (c) What do you mean by Zero Voltage Switching (ZVS). With neat circuit and waveform explain the operation of ZVS Converter **07**
- OR**
- (c) Explain the operation of Series loaded resonant (SLR) converter in (1) Discontinuous Current Mode ($\omega_s \leq \frac{1}{2} \omega_o$) (2) Continuous Current Mode ($\frac{1}{2} \omega_o \leq \omega_s \leq \omega_o$) **07**
- Q.3** (a) Explain the concept & need of Multi Level Inverter (MLI) **03**
 (b) Explain the operation of Class E converter **04**
 (c) Explain the operation of 5-Level DCMLI. Also discuss problems associated with DCMLI and how it will overcome. **07**
- OR**
- Q.3** (a) Explain Concept and requirement of Multi Pulse Converter (MPC) **03**
 (b) Draw the one line diagram of HVDC & Discuss the equipments of HVDC systems. **04**
 (c) With neat circuit diagram and waveform, Explain the operation of 5-level cascade H-bridge Inverter **07**
- Q.4** (a) Classification Of FACTS devices. **03**
 (b) Explain the operation of SEPIC converter. Derive the Equation of Output Voltage. **04**
 (c) Explain the how source current Harmonic Elimination using 12 Pulse Converter **07**
- OR**
- Q.4** (a) What is the need of Reactive Power Compensation? **03**
 (b) Explain the operation of CUK converter. Derive the Equation of Output Voltage **04**
 (c) Explain following transformer connection with phasor diagram used in multi pulse converter. (a) Y-Z1 (b) Δ -Z1 **07**
- Q.5** (a) What is FACTS? Discuss the advantages of FACTS in brief. **03**
 (b) Explain working principal of SSSC. **04**
 (c) Explain TCR with circuit diagram. Draw current and voltage waveforms for different values of α . **07**
- OR**
- Q.5** (a) Comparison of SVC & STATCOM. **03**
 (b) Explain working principal of UPFC **04**
 (c) Explain the Operation of FC-TCR. **07**