



# SANTHIRAM ENGINEERING COLLEGE, NANDYAL

Department of Electrical and Electronics Engineering

**Name of the Laboratory: POWER ELECTRONICS & SIMULATION**

**Regulation: R15**

**Branch: Electrical and Electronics Engineering**

**Year & Sem: III-II**

### Course Objectives

- The characteristics of power electronic devices with gate firing circuits
- Various forced commutation techniques
- The operation of single-phase voltage controller, converters and Inverter circuits with R and RL loads
- Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators

### Course Outcomes

- Test the turn on –turn off characteristics of various power electronic devices.
- Test and analyze firing circuits for SCRs
- Test different types of voltage controllers, converters and Inverters with R and RL loads
- Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators.

### List of Experiments

**Any Eight of the Experiments in Power Electronics Lab**

1. Gate Firing Circuits for SCRs
2. Single Phase AC Voltage Controller with R and RL
3. DC Jones Chopper with R and RL Loads
4. Forced Commutation Circuits
5. Three phase fully controlled Bridge converter with R- load
6. Single Phase Parallel, Inverter with R and RL Loads
7. Single phase Cycloconverter with R and RL loads
8. Single Phase Series Inverter with R and RL Loads
9. Single Phase Dual Converter with RL Loads
10. Illumination control / Fan control using TRIAC
11. Single phase Cycloconverter with R and RL loads

**Any Four Experiments of the following (1, 2, 3, A, B, C):**

1. Using TPS7A4901 and TPS7A8300, study
  - A. Impact of line and load conditions on drop out voltage
  - B. Impact of line and load conditions on efficiency
  - C. Impact of capacitor on PSRR
  - D. Impact of output capacitor on load-transient response Study of DC-DC Buck converter
2.
  - A. Investigate how the efficiency of a TPS54160 buck regulator depends on the line and load conditions and on the switching frequency
  - B. Analyze the influence of switching frequency  $f_s$  and of capacitance C and resistance ESR of the input and output capacitors on Steady-state waveforms of TPS54160 buck regulator.

### List of Equipments

1. Forced Commutation Study Unit
2. Study of Characteristics of SCRs, MOSFET&IGBT
3. Single Phase AC Voltage Controller with R & RL Load
4. Single Phase Cyclo Converter With RL Load Module
5. Single Phase Dual Converter With RL Load
6. Single Phase Fully Controlled Bridge Converter With R&RL Loads
7. Single Phase Series Inverter With RL Load
8. Single Phase Parallel Inverter With RL Load
9. 3-Phase Fully Controlled Bridge Converter with R-Load
10. Single Phase Half Controlled Bridge Converter With R&RL Load Module
11. Gate Firing Circuits (R&RC) from SCR
12. 3-Phase Half Controlled Bridge Converter with R-Load
13. DC Jones Chopper With R&RL Load Module
14. PMLK-LDOE & PMLK BUCK
15. Computer with Web Bench Software



#### Lab Instructor:

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#### Lab Assistant:

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