# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E. SEMESTER : VIII

## BIOMEDICAL ENGINEERING

Subject Name: **ELECTRONICS SYSTEM DESIGN (ESD)**

| Sr. No. | Course Contents | Total Hrs |
|---|---|---|
| | **ELECTROMECHANICAL SYSTEMS:** | |
| **1.** | **Electro mechanical energy conservation:** Principle of electro mechanical energy conservation, Use of magnetic for energy conservation, Analysis of simple magnetic circuit, Magnetic system with mechanical motion, Electromagnetic & Solid state relay, Case study; Solenoid design, Servo motor construction and application | **05** |
| **2.** | **Step motor:** PM, VR & hybrid Step motor, its construction, its relative merits and demerits. Static & dynamic torque speed characteristics, Half step & micro stepping. | **04** |
| **3.** | **Drives & suppression circuit:** Various drives circuit for step motion performance improvement Different suppression circuits. | **04** |
| | **POWER ELECTRONIC SYSTEMS:** | |
| **4.** | **Power Electronics:** Overview, Power Semiconductor Devices & Control Characteristics, Characteristics and Specification of Switches, Types of Power Diodes, Diodes with various Loads, Freewheeling Diodes, Performance Parameters of Rectifiers, Power BJTs, Power MOSFETs, IGBTs, MOSFET Gate and BJT Base Drive Circuits, Isolation of Base & Gate Drive Circuits. | **10** |
| **5.** | **Thyristor:** Characteristics, Two Transistor model of Thyristor, Thyristor Turn-On, Thyristor Turn-Off, Types of Thyristors, Series & Parallel Connections of Thyristors, & Gate drive circuits. | **05** |
| **6.** | **Inverters:** Principal of Operation of Pulse Width Modulated Inverters, Performance Parameters, Single Phase Bridge Inverters, Current Source Inverter, Series Resonant Inverter, Parallel Resonant Inverter, Class E Resonant Inverter, Multilevel Inverter Concept, Applications & features of Multilevel Inverter. | **05** |
| **7.** | **Converters:** Principal of Step Down Converter, Principle of Step UP Converter, Performance Parameters, Converter Classification, Switch Mode Buck, Boost and Buck-Boost Regulators, UPS as AC Power Supply. | **05** |
| | **ELECTRO-MAGNETIC COMPATIBILITY** | |
| **8.** | Basic Introduction, E field and H field noise, Noise problem with analog circuit, Assembly and grounding and shielding considerations for analog circuit, EMC Issues Digital circuit, Problems with circuit containing Processors, ESD, Case studies: Linear power supply, ECG amplifier, Temperature Measurement amplifiers, Instrumentation amplifier, Isolation amplifier. | **12** |

**The Practical and Term work will be based on the topics covered in the syllabus.**

**Text Books**:


1. Rasid, Muhammad, H., "Power Electronics Circuits, Devices and Applications", PHI & Pearson Education, 3rd Edition.
2. Singh., M., D., & Khanchandani, K., B., "Power Electronics", TMH Publications.
3. Asghar, Jamil, M. S., "Power Electronics", PHI Publications.
4. Ott, H., W., "Noise Reduction Techniques in Electronic Instruments".