

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B. E. SEMESTER: V

### POWER ELECTRONICS ENGINEERING

Subject Name: **Applied Power Electronics**

Subject Code: **152403**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	0	4	70	30	50

Sr. No.	Course Content
1	<b>Introduction:</b> <ul style="list-style-type: none"><li>• Power Electronics, requirements and application areas</li><li>• Brief idea of Power Electronics application in areas like Power System, Motion Control, Heating, Automotive, Electric Welding, Renewable energy sources etc.</li><li>• Concept of power processing.</li></ul>
2	<b>Signal Processing:</b> <ul style="list-style-type: none"><li>• Concept of Signal Processing and its requirements in PES</li><li>• Analog signal processing circuits like precision rectifier, Log and Antilog Amplifier, Voltage multiplier, Divider, peak detector etc</li><li>• Switched Capacitor circuits concept and realization of simple circuits</li><li>• Analog computation, solution of simultaneous equations and differential equations through analog circuits</li><li>• ADC and DAC, V/F, F/V Converters, PLL</li><li>• Timing Circuit, Multivibrators, Timer, PWM techniques</li></ul>
3	<b>Filters Circuits:</b> <ul style="list-style-type: none"><li>• Analog filter circuits,</li><li>• Filter response types, BP, HP, Notch, LP, Band Stop filter and basic circuits</li><li>• Special filter circuits like state variable filter, biquad filter etc.</li><li>• Switched Capacitor filter circuit</li></ul>
4	<b>Basic Power Modulator:</b> (Basic power Diagram, working, advantages and disadvantages and classification only) <ul style="list-style-type: none"><li>• Controlled &amp; Uncontrolled rectifier Circuits</li><li>• Inverter</li><li>• Cyclo-converter</li><li>• DC to DC converter</li></ul>
5	<b>Power System Applications Introduction:</b> <ul style="list-style-type: none"><li>• Power system problems</li><li>• Concept and working of HVDC Transmission, Power factor correction, Static VAR Compensation, Active power filter</li><li>• Interconnection of renewable energy sources and Energy storage system to the utility grid.</li></ul>

Sr. No.	Course Content
6	<b>Power Supply and energy storage:</b> <ul style="list-style-type: none"> <li>• Concept, working and types of SMPS and UPS</li> <li>• Battery principle, Battery types, construction, applications</li> <li>• Charging methods and charging circuits for battery</li> <li>• Power Supply applications in various electronics systems</li> </ul>
7	<b>Industrial Applications:</b> <ul style="list-style-type: none"> <li>• Induction Heating and dielectric heating</li> <li>• Electric Welding</li> <li>• Electroplating</li> <li>• Ultrasonic</li> </ul>
8	<b>Consumer Electronics Applications:</b> <ul style="list-style-type: none"> <li>• High Frequency Fluorescent lighting, LED lighting, fan regulator, Space Heating , Air Conditioning, Induction Cooking</li> </ul>
9	<b>Motor Drives and Applications:</b> <ul style="list-style-type: none"> <li>• Working principle of AC and DC Motor drives</li> <li>• Automation in industry and motor drives applications like flow control, robot control, Electric Train, battery operated vehicles, conveyer belt, elevator, hoist etc.</li> </ul>
10	<b>Simulation of PES:</b> <ul style="list-style-type: none"> <li>• Concept of simulation of power electronics systems, Simulation of simple PES</li> </ul>

### Reference Books:

1. Power Electronics Devices, Circuits and Industrial Applications, Oxford, V.R. Moorthi
2. Power Electronics Converters, Applications and design, Wiley, Mohan, Undeland, Robbins
3. Power Electronics Circuits, Devices and Applications, M.H. Rashid
4. Power Electronics, M. D. Singh, Khanchandani
5. Thyristors Theory and Applications, Sugandhi and Sugandhi
6. Design With Operational Amplifiers and Analog Integrated Circuits, Sergio Franco
7. Various Semiconductor Device & IC manufacturer's Application note and data sheets.