

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

POWER ELECTRONICS ENGINEERING

Subject Name: **Power Electronics Applications (Institute Elective - II)**

Subject Code: **152405**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No.	Course Content
1	Introduction: <ul style="list-style-type: none">• Power Electronics System(PES) – Overview- Components & Building Blocks of PES– Power Switching Devices• Ideal switch characteristics, Semiconductor materials for Power Switches- Semiconductor Power Switches and classification
2	Power Semiconductor Devices: <ul style="list-style-type: none">• Power diode – Power BJT – Power MOSFET- IGBT – MCT : construction- characteristics - operation – application - SCR - Operating principle- characteristics- Thyristor - Construction - Turn ON and Turn OFF Mechanism - other triggering devices (DIAC–TRIAC-UJT-PUT etc.)
3	Basic Power Electronic Modulator: (Diagram-working-advantages-disadvantages-application) <ul style="list-style-type: none">• Controlled & Uncontrolled rectifier Circuits• Inverter• Cyclo-converter• DC to DC converter
4	Power Supply Application: <ul style="list-style-type: none">• DC Regulator - Principle of SMPS – Types of SMPS – Application of SMPS• UPS –Necessity of UPS- Types of UPS –Operating Principle• Applications of UPS and SMPS
5	Motion Control Application: <ul style="list-style-type: none">• Introduction - Advantage and disadvantage of drives• DC Motor Drive – AC Motor Drive – Synchronous Motor Drives – Single Phase Induction Motor Drive• Motor Drive Applications like flow control, hoist, elevator, conveyor belt, battery operated vehicles, machine tool control etc.
6	Domestic Application of Power Electronics: <ul style="list-style-type: none">• Principle and working of High Frequency Fluorescent lighting –Electronic Lamp Ballast- LED lighting-Illumination Level of Incandescent Lamp – Electronic fan regulator - Space Heating – Electric Air Conditioning - Induction Cooking

7	Power System Applications: <ul style="list-style-type: none"> • HVDC Transmission - Power factor correction – Excitation Systems for Alternators – Static Circuit Breaker–DC Circuit Breaker • Utilization of Non conventional Energy Source in power generation using power electronics.
8	Industrial Application: Electronics Timer – Electric Welding – Induction Heating – Die electric Heating – Electroplating – Static Switch using Power Switch - DC Electric Traction System

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