

# GUJARAT TECHNOLOGICAL UNIVERSITY

## POWER ELECTRONICS & ELECTRICAL DRIVES (45)

POWER ELECTRONICS-II

SUBJECT CODE: 2724502

SEMESTER: II

**Type of course:** Engineering Science (Electrical)

**Prerequisite:** NA

**Rationale:** NA

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
		PA	ALA		ESE	OEP				
3	2#	0	4	70	20	10	30	0	20	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
<b>1</b>	<b>Resonant Converter:</b> Series resonant converters – with unidirectional & bidirectional switches, frequency response of series resonant converters, parallel resonant converters, voltage control of resonant converters, Class E resonant converters, ZCS, ZVS, Quasi resonant converter, resonant dc-link converters	<b>10</b>	<b>25</b>
<b>2</b>	<b>Multilevel Converters:</b> Concept, types:- diode-clamped, flying capacitor and cascade, operation of different types of multilevel converters, dc-link capacitor voltage balancing, comparison of different multilevel converters, control- SPWM & SVM for three level converters, harmonic elimination	<b>10</b>	<b>25</b>
<b>3</b>	<b>Advanced Power electronic converters:</b> Multi-Pulse Converters, Matrix Converters, Extended-Period Quasi-Resonant converter, Multiresonant converters	<b>6</b>	<b>15</b>
<b>4</b>	<b>Power Supplies:</b> Types of dc & ac power supply- switched-mode, resonant & bidirectional, current and voltage mode control of power supply	<b>8</b>	<b>20</b>
<b>5</b>	<b>Applications of power electronic converters:</b> Electronic ballast, Resonance charging, HVDC, Photovoltaic systems.	<b>6</b>	<b>15</b>

**Reference Books:**

- Rashid, M. H., "Power Electronics Handbook", Academic Press, 2001.
- Ned Mohan, Tore M. Undeland and William P. Robbins, "Power Electronics Converters, Applications, and Design", John Willey & Sons, Inc., 2nd Edition, 1995.
- Agrawal, J. P., "Power electronic systems: Theory and design" Addison Wesley Longman (Singapore) Pte. Ltd. New Delhi, 2001.
- Rashid, M. H., "Power Electronics: Circuits, Devices and Applications", Pearson, 2004.
- Joseph Vithayathil, "Power Electronics: Principles and Applications", McGraw-Hill, 1995.

**Course Outcome:**

After learning the course the students should be able to:

- Understand operation of various power electronic converters
- Know various control techniques for power electronic converters
- Develop power electronic converter based systems

**List of Open Source Software/learning website:**

- E-materials available at the website of NPTEL- <http://nptel.ac.in/>
- PSIM (Demo version): Software is useful for simulation and analysis of electronic circuits.
- MATLAB (Trial version): Software is useful for simulation and analysis of electrical systems

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website