

SRM University  
**M.Tech Automotive Hybrid Systems Engineering**  
 (Collaborative program with NFTDC, Hyderabad)  
 (Proposed syllabus from the academic year 2015-16)

**Optional / elective courses (program electives)**

		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>AH2124</b>	<b>ADVANCED POWER ELECTRONICS FOR xEVs</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	<b>Total Contact Hours-45</b>				
	<b>Prerequisites</b>				
	<b>Nil</b>				
<b>PURPOSE</b>					
To study the power electronics components required for xEVs and its characteristics.					

**UNIT I: BASIC POWER ELECTRONIC DEVICES**

Diodes, Thyristors, Bipolar Junction Transistors, Metal–Oxide–Semiconductor Field Effect Transistors, Insulated Gate Bipolar Transistors

**UNIT II: DC/DC CONVERTER**

Basic Principle of DC–DC Converter, Step-Down (Buck) Converter, Steady-State Operation, Output Voltage Ripple, Step-Up (Boost) Converter, Step-Down/Up (Buck–Boost) Converter, DC–DC Converters Applied in Hybrid Vehicle Systems, Isolated Buck DC–DC Converter, Four-Quadrant DC–DC Converter

**UNIT III: DC–AC INVERTER**

Basic Concepts of DC–AC Inverters, Single-Phase DC–AC Inverter, Three-Phase DC–AC Inverter

**UNIT IV: ELECTRIC MOTOR DRIVES**

BLDC Motor and Control, Operation of BLDC Motor, Torque and Rotating Field Production, BLDC Motor Control, BLDC Motor Torque–Speed Characteristics and Typical Technical Parameters, Sensorless BLDC Motor Control, AC Induction Motor and Control, Basic Principle of AC Induction Motor Operation, Controls of AC Induction Motor

**UNIT V: PLUG-IN BATTERY CHARGER DESIGN**

Basic Configuration of PHEV / BEV Battery Charger, Power Factor and Correcting Techniques, Controls of Plug-In Charger.

**References:**

1. Rashid M.H., "*Power Electronics Circuits, Devices and Applications*", Prentice Hall India, Third Edition, New Delhi, 2011.
2. Bimal K Bose, "*Modern Power Electronics and AC Drives*", Pearson Education, second Edition, 2003
3. Dubey. G.K., "*Thyristorised power controllers*", New age International, New Delhi, 2002.
4. Bhimbhra P.S., "*Power Electronics*", Khanna Publishers, New Delhi, 2005.
5. P.C. Sen, "*Modern Power Electronics*", Wheeler Publishing Co, Third edition, New Delhi, 2008.
6. Ned Mohan, Undeland and Robbin, "*Power Electronics: converters, Application and design*", John Wiley and sons.Inc, Newyork, Reprint 2009.

7. R.Krishnan, "*Electric Motor Drives- Modeling, Analysis and Control*", Prentice-Hall of India Pvt. Ltd., New Delhi, 2007.
8. Davide Andrea,"*Battery Management Systems for Large Lithium-ion Battery Packs*" Artech House, 2010.