

INTRODUCTION OF NEW COURSE

Course Title	Design of electronic Cooling system and packaging	Course No (will be assigned)				
Specialization	Electronic Engg.	Structure (LTPC)	L	T	-	3
Offered for	B.Tech / M.Des / Ph.D	Status	Core <input type="checkbox"/>	Elective <input checked="" type="checkbox"/>		
Faculty	Dr. B. Raja	Type	New <input checked="" type="checkbox"/>	Modification <input type="checkbox"/>		
Pre-requisite		To take effect from				
Submission date		Date of approval by AAC				
Objectives	This elective course aims to expand the scope of the electronic engineer to include the importance of effective heat transfer in electronic equipments. The course will explain the design of different types of cooling system used for electronic devices used in the recent days in various fields like avionics, power generation, super computers, miniaturized devices etc. Also, the mechanical reliability of the device with respect to thermal management will be introduced.					
Contents of the course (With approximate break up of hours) - 45 hrs	<p>Cooling Load of Electronic Equipment in a Thermal Environment - Thermal consideration in The Chip Carrier, PCBs and Enclosure. <b>(5 hrs)</b></p> <p>Design Application of Conduction Cooling, Heat sinks, Conduction in Chip Carriers, Conduction in PCB, Heat Frames and Thermal Conduction Module (TCM) <b>(10 hrs)</b></p> <p>Design application of Natural Convection and Radiation in electronic cooling <b>(5 hrs)</b></p> <p>Design application of Forced Convection Cooling - Fan Selection, fluid selection, Liquid Cooling, Immersion Cooling <b>(10 hrs)</b></p> <p>Design and analysis for mechanically reliable systems and thermal mapping of Electronic devices <b>(10 hrs)</b></p> <p>Electronic energy harvesting - Peltier and Seebeck effects <b>(5 hrs)</b></p>					
Text and References	<p><b>Text books</b></p> <ol style="list-style-type: none"> <li>Ralph Remsburg, Advanced Thermal Design of Electronic Equipment, 1<sup>st</sup> Ed, 1998, CRC Press</li> <li>Dave S. Steinberg, Cooling Techniques for Electronic Equipment, 1991, John Wiley &amp; Sons, Inc</li> </ol> <p><b>References</b></p> <ol style="list-style-type: none"> <li>W.M. Rohsenow, J.P Hartnett, C. Young, Heat Transfer Handbook, 1998, McGraw-Hill</li> <li>Kaveh Azar, Thermal Measurements in Electronics Cooling, 1997, CRC Press</li> <li>All Jamnia, Practical Guide to the Packaging of Electronics, 2002, CRC Press</li> <li>Yunus A. Cengel and Michael Boles Thermodynamics: An Engineering Approach, 6<sup>th</sup> Ed, 2001, McGraw-Hill</li> </ol>					