NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OUTLINE TEMPLATE			
Course Title	Power Conversion Laboratory		
Course Code	EE 607	**No. of Credits**	02
Department	Electrical and Electronics Engineering	**Faculty**	Dr. K. Sundareswaran
Pre-requisite Course	Knowledge of power semiconductor devices and power converters at UG level		
Course Coordinator	---		
E-mail		**Telephone No.**	
Course Type	☐ **Core course** ☐ **Elective course** ☑ **Laboratory course**		

COURSE OVERVIEW

Power electronics can be considered as the technology associated with the conversion, control and conditioning of electric power from its available form to the desired electrical form, by the application of power semiconductor devices. Power Electronics will play a dominant role in the 21st century in industrial and utility applications with increased emphasis on energy saving and efficient control of industrial processes thereby helping to preserve the environment. Application of Power Electronics ranges from power supplies to motion control, factory automation, transportation, energy storage, multi-megawatt industrial drives, power quality and electric power transmission / distribution.

The primary goal of this course is to give an in-depth laboratory experience in analysis, operation and control of typical power converters. Various power electronic converters are simulated and designed in the laboratory to explore the characteristics of switching devices and its application in various power converters namely, dc-dc, dc-ac, ac-dc and ac-ac converters.

COURSE OBJECTIVES

To enable the Power System students to get an insight into the basic Power Electronic Circuits. Also, to familiarize with the switching devices, power converters and its application in power systems for power control.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
On completion of the course, the students will be able to 1. Test and analyse the basic rectifier and inverter circuits. 2. Test and analyse controlled circuits and circuit breakers 3. Design basic Power Electronic Control Circuits for Power System Applications	

Programme Outcomes (PO)	CO1	CO2	CO3
1	-	M	M
2	L	M	M
3	-	-	-
4	-	-	-
5	H	L	H
6	M	M	M
7	L	H	M
8	L	M	L
9	-	-	-
10	L	H	H
11	M	M	H
12	M	H	H
13	L	M	M
14	-	M	M

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week	Topic	Mode of Delivery
1.	2nd of August (1 session)	Introduction to the Laboratory, experiments and flexible mode of course delivery	Discussion in class
2.	4th and 9th of August	Simulation of Single Phase Full Converter using IGBT with PWM	Simulation
3.	11th and 16th of August	Simulation of Buck Converter using MOSFET	Simulation
4.	18th and 23rd of August	Simulation of Boost Converter using MOSFET	Simulation
5.	30th of August and 1st of September	Simulation of Single Phase Voltage Source Inverters using IGBTs	Simulation
6.	13th and 15th of September	Simulation of Three Phase Voltage Source Inverters using IGBTs (120^0 and 180^0 mode)	Simulation
7.	20th and 27th of September	Simulation of Single Phase AC Chopper	Simulation
8.	4th and 6th of October	Study of a Single Phase Semi-Converter using SCR (Module)	Experimentation

9.	11th and 13th of October	Study of a Single Phase Full Converter using SCR (Module)	Experimentation
10.	20th and 25th of October	Study of a Buck-Boost Converter using MOSFET (Module)	Experimentation
11.	27th of October and 1st of November	Study of Single Phase Cycloconverter (on-off control) (Module)	Experimentation
12.	3rd and 8th of November	Study of Single Phase AC Voltage Controller with lamp load (Module)	Experimentation
13.	10th and 15th of November	Repeat of Experiments for absentees	Simulation and Experimentation

COURSE ASSESSMENT METHODS

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	**Internal assessment** **- Results** **- Viva voce** **- Documentation**	Weekly	-	**60%**
2.	**End Semester Exam**	IV week of November (Tentative)	**One session**	**40%**

ESSENTIAL READINGS : Textbooks, reference books, Website addresses, journals, etc

1) Ned Mohan, Undeland and Robbin, 'Power Electronics: converters, Application and design', John Wiley and sons. Inc, 3rd Edition, 2002.
2) L. Umanand, 'Power Electronics: Essentials & Applications', Wiley India Pvt. Ltd., 2009.
3) M. H. Rashid, 'Power Electronics Circuits, Devices and Applications', Pearson, 3rd Edition, Twelfth impression, 2013.
4) Singh M.D., Khanchandani K. B., 'Power Electronics', Tata McGraw-Hill, 2nd Edition, 2008.

COURSE EXIT SURVEY

1. Students' feedback through class committee meetings
2. Feedback from students on Course Outcomes at the end of the semester

COURSE POLICY

1. All the students are expected to attend all the laboratory sessions. Students not having 75% minimum attendance at the end of the semester will have to REDO the course.
2. Students who are absent for regular laboratory sessions can redo the particular experiment at the end of the semester. However, the assessment for that particular experiment will be only for 80% of the regular internal assessment.
3. The minimum marks for passing this course and grading pattern will adhere to the regulations of the institute.
4. In case of any student found guilty indulging in any mal practice, the student will be awarded no marks in that particular assessment. If found using mobile phones or any other gadgets for any mal-practice during the final examination, the answer sheet of the student will not be evaluated and will be awarded ZERO marks.

ADDITIONAL COURSE INFORMATION

1. The Faculty is available for consultation during the time intimated to the students then and there.
2. All correspondence will be sent to the webmail id of the students alone if required.
3. The students will be communicated through the email id: kse@nitt.edu for any academic related issues (including sharing of study materials) with respect to this course.

FOR SENATE'S CONSIDERATION

31/07/2017 31/07/2017

[Dr. K. Sundareswaran, Prof./EEE]	[Dr. C. Nagamani]	HoD (Dept. of EEE)
Course Faculty	CC-Chairperson	