



DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech. (Power Electronics)		
Course Title	Power Converters		
Course Code	EE 651	No. of Credits	3
Course Code of Pre-requisite subject(s)	Power Electronics in UG		
Session	July / January 2021	Section (if, applicable)	A/B
Name of Faculty	N. Kumaresan	Department	EEE
Official Email	nkumar@nitt.edu	Telephone No.	0431-2503257
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Analysis of power semiconductor switched circuits with R, L, RL, RC loads, d.c. motor load, battery charging circuit.</p> <p>Single-Phase and Three-Phase AC to DC converters-half controlled configurations- operating domains of three phase full converters and semi-converters – Reactive power considerations.</p> <p>Analysis and design of DC to DC converters- Control of DC-DC converters, Buck converters, Boost converters, Buck-Boost converters, Cuk converters</p> <p>Single phase and Three phase inverters, Voltage source and Current source inverters, Voltage control and harmonic minimization in inverters.</p> <p>AC to AC power conversion using voltage regulators, choppers and cyclo-converters, consideration of harmonics, introduction to Matrix converters.</p> <p>References Books:</p> <ol style="list-style-type: none"> 1. Ned Mohan, Undeland and Robbin, 'Power Electronics: converters, Application and design', John Wiley andsons. Inc, Newyork, 2006. 2. RashidM.H., 'PowerElectronics-Circuits,DevicesandApplications',PrenticeHall India, NewDelhi, 2009. 3. P.CSen., 'Modern Power Electronics', Wheeler publishing Company, 1st Edition, New Delhi, 2005. 			



COURSE OBJECTIVES						
To give a systematic approach for transient and steady state analysis of all power electronic converters with passive and active loads						
MAPPING OF COs with POs						
Course Outcomes		Programme Outcomes (PO) (Enter Numbers only)				
Upon completion of the course, the students will be able to		COs / POs	Course outcomes(COs)			
			1	2	3	
1. To study and analyze transient response of basic power electronic circuits		Programme Outcomes (POs)	1	H	H	H
			2	H	H	M
			3	H	H	H
			4	M	M	M
2. To understand the working of commonly used power Converters			5	H	H	H
			6	M	M	M
			7	M	M	M
			8	L	L	L
			9	L	L	L
			10	L	L	L
			11	H	H	H
			12	H	H	H
			13	H	H	H
			14	M	M	M
3. To analyze and design various power converter systems						

COURSE PLAN – PART II			
COURSE OVERVIEW			
<p>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 is one of the fastest developing technologies today, having gone through dynamic changes in the last several decades.</p> <p>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. Further it is expected to evolve in several directions such as integrated systems for electronic power processing, intelligent control and energy management, distributed generation, automotive applications, electric traction, emerging applications in commercial / residential areas. 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.</p> <p>Aim of this course is to give the exposure to the students on the analysis, operation and control of typical power converters, namely, dc-dc, dc-ac, ac-dc and ac-ac converters. This course also aims to apply the mathematical skills to a number of practical / design problems. Practical application of typical converters will be presented to the students as case study.</p>			
COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)			
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 to Week 2 6-17, September 6 contact hours	Analysis of power semiconductor switched circuits with R, L, RL, RC and RLC loads, d.c. motor load, battery charging circuit.	Lecture - C&T in online mode



2	Week 3 to Week 5 20 th September to 8 th October 9 contact hours	Single-Phase and 3-Phase AC to DC converters - half controlled configurations - operating domains of 3-phase full converters and semi-converters – Reactive power considerations.	Lecture - C&T in online mode
3	Week 6 to Week 8 11 th October to 29 th October 8 contact hours	Assessment 1 in Week 7 Analysis and design of DC to DC converters - Control of DC-DC converters, Buck converters, Boost converters, Buck-Boost converters, and Cuk converters	Lecture - C&T in online mode
4	Week 10 to Week 12 8 th November to 26 th November 8 contact hours	Assessment 2 in Week 12 Single phase and Three phase inverters, Voltage source and Current source inverters, Voltage control and harmonic minimization in inverters.	Lecture - C&T in online mode
5	Week 13 to Week 15 29 th November to 17 th December 7 contact hours	AC to AC power conversion using voltage regulators, choppers and cyclo-converters, consideration of harmonics, introduction to Matrix converters.	Lecture - C&T in online mode
6	Week 16 to Week 17	Final Assessment	---

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment 1	Week 7	75 minutes	25
2	Assessment 2	Week 12	75 minutes	25
3	Seminar / case study / design work	Details will be informed during the course		20
CPA	Compensation Assessment	Week 15	75 minutes	25
4	Final Assessment	Week 16 to Week 17	120 minutes	30

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Feedback from the students during class committee meetings
Anonymous feedback through questionnaire



COURSE POLICY (including compensation assessment to be specified)

Assessment

1. Attending all the assessments (except CPA) are MANDATORY for every student.
2. If any student is not able to Assessment 1 and / or Assessment 2 due to genuine reasons, student is permitted to attend the compensation assessment (CPA) with 25 % weightage (25 marks). At any case, CPA will not be considered as an improvement test.
3. Relative grading will be based on the clusters (range) of the total marks scored for grading by adopting Gap theory / Normalized curve. Letter grades and the corresponding grade points will be as per institute norms.
4. Suggestion (if any) from Class Committee / Office of the Dean (Academic) on the assessment / grading will be honoured with intimation to the students.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

1. All the students are advised to check their NITT WEBMAIL regularly.
2. Queries (if required) may be emailed to me / contact me during 4.00 pm to 5.00 pm on Monday with prior intimation for any clarifications

FOR APPROVAL

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Course Faculty

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CC- Chairperson Dr. S. Kayalvizhi HOD Approved by HoD



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.