



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF Electrical and Electronics Engineering

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. – Electrical and Electronics Engineering		
Course Title	INTRODUCTION TO SWITCHED MODE POWER SUPPLIES		
Course Code	EEPE42	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEPC19		
Session	July 2022	Section (if, applicable)	A & B
Name of Faculty	Dr. Shelas Sathyan	Department	EEE
Official Email	shelassathyan@nitt.edu	Telephone No.	9561450634
Name of Course Coordinator(s) (if, applicable)	NA		
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Linear power supplies, Shunt Regulators, concept of switched mode power supplies, ideal characteristics of switch, realization of ideal switch characteristics from semiconductor switches, current bidirectional switch realization, voltage bidirectional switch realization, four quadrant switch realization, Volt- second balance, charge second balance, small ripple approximation.</p> <p>Steady state analysis of basic non-isolated converters, Continuous conduction mode operation, Analysis of basic converters in discontinuous conduction mode, selection of components-switches, Diodes, Inductor, capacitor.</p> <p>Steady state analysis of isolated converters, forward converter, Core resetting techniques in forward converters, flyback converter, flyback converter with RCD clamp, Two switch flyback converter, Half bridge and full bridge DC/DC converter.</p> <p>Gate Driver Design, Capacitors for Power supplies, Magnetic materials for Power Electronics, high frequency Inductor design, high frequency Transformer design, Heat sink design, Snubber circuit design.</p> <p>Applications of switched mode power supplies in consumable electronics, fuel cell power generation system, solar PV systems, Data centre power system, EV onboard and offboard battery charging systems, microgrid</p> <p>Text Books:</p> <ul style="list-style-type: none"> Ned Mohan "Power Electronics: A First Course," First edition, Wiley Publication, 2011. Robert Erickson, Dragan Maksimovic "Fundamentals of power electronics", Springer publications, 2001. 			
COURSE OBJECTIVES			



To understand the concepts and design of switched mode power converters for real world applications	
MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. To realize various ideal switch characteristics from semiconductor switches	2,4
2. To analyse various non-isolated and isolated power converters	4,8
3. To analyse and design the HF inductor, transformer, gate drivers	4,8
4. apply the knowledge to real world applications	2,4,8,12,14

COURSE PLAN – PART II			
COURSE OVERVIEW			
This course deals with the design and analysis of basic switched mode power converters in detail			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	August 2nd week to 4th week	Linear power supplies, Shunt Regulators, concept of switched mode power supplies, ideal characteristics of switch, realization of ideal switch characteristics from semiconductor switches, current bidirectional switch realization, voltage bidirectional switch realization, four quadrant switch realization, Volt- second balance, charge second balance, small ripple approximation.	Chalk and Talk
2	September 1st week to 4th week	Steady state analysis of basic non-isolated converters, Continuous conduction mode operation, Analysis of basic converters in discontinuous conduction mode, selection of components-switches, Diodes, Inductor, capacitor.	
3	October 1 st week to 4th week	Steady state analysis of isolated converters, forward converter, Core resetting techniques in forward converters, flyback converter, flyback converter with RCD clamp, Two	



		switch fyback converter, Half bridge and full bridge DC/DC converter.	Chalk and Talk
4	November 1st week 3rd week	Gate Driver Design, Capacitors for Power supplies, Magnetic materials for Power Electronics, high frequency Inductor design, high frequency Transformer design, Heat sink design, Snubber circuit design.	
5	4th week of September and 1st week of December	Applications of switched mode power supplies in consumable electronics, fuel cell power generation system, solar PV systems, Data centre power system, EV onboard and offboard battery charging systems, microgrid.	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Class Test -1	3rd week of September	1hr	20%
2	Class Test-2	3rd week of October	1hr	20%
3	Assignment	Throughout the semester	-	10%
CPA	Compensation Assessment*	December 1 st week	1hr	20%
4	Final Assessment *	December 2nd Week	3hr	50%

*mandatory; refer to guidelines on page 4

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

- Feedback from students during class committee meetings
- Feedback through questionnaire

COURSE POLICY (including compensation assessment to be specified)

- The above course has 5 assessments in total and one compensation (A1, A2, A3, A4, CPA)
- There will be no compensation assessment for Assessment-3
- The compensation assessment will include the complete syllabus

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

FOR APPROVAL

Course Faculty

CC- Chairperson

HOD