Course code	Course Name	L-T-P - Credits	Year of Introduction
EE364	**Switched Mode Power Converters**	**3-0-0-3**	**2016**

Prerequisite : Nil

Course Objectives
- To study and analyze various types of switched mode dc- dc converters, inverters and resonant converters and its switching techniques.

Syllabus

DC-DC convertors without isolation – switched mode power supply – DC-DC converters with isolation – switched mode DC-AC converter – sine PWM and space vector PWM - resonant converter

Expected outcome.

The students will have
  i.   ability to analyze and design switched mode power converters
  ii. proper understanding about soft switching and its applications
  iii. deep knowledge in pulse width modulated techniques

Text Book:
1. Mohan, Undeland, Robbins, *Power Electronics – Converters Application and Design*, Wiley-India
2. Muhammad H. Rashid, *Power Electronics – Circuits, Devices and Applications*, Pearson Education

References:
1. Abraham Pressman, *Switching Power supply Design*, McGraw Hill

	Course Plan		
Module	**Contents**	**Hours**	**Sem. Exam Marks**
I	Switched Mode DC-to-DC Converter - buck converters – boost Converter – buck-boost converter - Continuous Conduction mode – design of filter inductance & capacitance - boundary between continuous and discontinuous conduction – critical values of inductance/load resistance - discontinuous conduction mode with constant output voltage - Output voltage ripple	7	15%
II	Cuk converter – Full-ridge dc-dc Converter – PWM with bipolar voltage and unipolar voltage switching –comparison of dc-dc converters - Linear Power Supply – disadvantages of linear power supply – switched mode power supply – dc-dc converters with electrical isolation –unidirectional core excitation & bidirectional core excitation	7	15%
	FIRST INTERNAL EXAMINATION		
III	Fly back converter – continuous & discontinuous conduction mode - double ended fly back converter – forward converters – basic forward converter – practical forward converter – continuous conduction mode only - double ended forward converter – push pull converter – half bridge converter – full bridge converter – continuous conduction mode – current source dc-dc converter	7	15%
IV	Switched Mode DC to AC converter – 1-phase square wave full-bridge inverter – square wave switching scheme - sine PWM switching scheme – PWM with bipolar & unipolar voltage switching - harmonic analysis of output voltage – output control by voltage cancellation - 3-phase voltage source inverter – 3-phase sine PWM inverter – RMS line to line voltage & RMS fundamental line-to-line voltage – square wave operation -	8	15%

	Switching utilisation ratio of 1-phase & 3-phase full-bridge inverters		
SECOND INTERNAL EXAMINATION		
V	Concept of space vector – space vector modulation – reference vector & switching times – space vector sequence – comparison of sine PWM & space vector PWM - programmed (selective) harmonic elimination switching – current controlled voltage source inverter - hysteresis current control	6	20%
VI	Resonant Converters - Basic resonant circuit concepts – series resonant circuit – parallel resonant circuit – load resonant converter - ZCS resonant converter - L type & M type - ZVS resonant converter – comparison of ZCS & ZVS Resonant Converters	7	20%
END SEMESTER EXAM		

QUESTION PAPER PATTERN:

Maximum Marks: 100   Exam Duration: 3Hourrs.

Part A: 8 compulsory questions.

One question from each module of Module I - IV; and two each from Module V & VI.

Student has to answer all questions. (8 x5)=40

Part B: 3 questions uniformly covering Modules I & II. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part C: 3 questions uniformly covering Modules III & IV. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part D: 3 questions uniformly covering Modules V & VI. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.