

| 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 | | | |
| <ul style="list-style-type: none"> 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 | | | |
| <ol style="list-style-type: none"> ability to analyze and design switched mode power converters proper understanding about soft switching and its applications deep knowledge in pulse width modulated techniques | | | |
| Text Book: | | | |
| <ol style="list-style-type: none"> Mohan, Undeland, Robbins, <i>Power Electronics – Converters Application and Design</i>, Wiley-India Muhammad H. Rashid, <i>Power Electronics – Circuits, Devices and Applications</i>, Pearson Education | | | |
| References: | | | |
| <ol style="list-style-type: none"> Abraham Pressman, <i>Switching Power supply Design</i>, 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% |

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|------------------------------------|--|---|-----|
| | 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: 3Hours.

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 x 5)=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.