

SWITCHED MODE POWER CONVERSION

| | | | | | |
|--|-------------------------|---------------------------------|-------|----------------------|-------------------|
| Course Code | 20EE4703D | Year | IV | Semester(s) | I |
| Course Category | Professional Elective-V | Branch | EEE | Course Type | Theory |
| Credits | 3 | L-T-P | 3-0-0 | Prerequisites | Power Electronics |
| Continuous Internal Evaluation: | 30 | Semester End Evaluation: | 70 | Total Marks: | 100 |

Course Outcomes

Upon successful completion of the course, the student will be able to

| | |
|-----|--|
| CO1 | Understand Switch Mode Power Conversion and classify the DC to DC Converters. (L2) |
| CO2 | Differentiate the various Power semiconductor switches. (L3) |
| CO3 | Illustrate Isolated Power Conversion (L3) |
| CO4 | Analyze the performance of the Magnetic Components (L4) |
| CO5 | Analyze the switching regulator control, soft-switched dc-dc power converters (L4) |
| CO6 | Ability to design the various Switch mode power Converter and submit a report. |

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | 1 | 2 |
| CO2 | 3 | | | | | | | | | | 3 | | 1 | 2 |
| CO3 | 3 | | | 3 | | | | | | | | | 1 | 2 |
| CO4 | | 2 | 2 | | | | 3 | | | | | | 1 | 2 |
| CO5 | | 2 | 2 | 3 | | | | | | | 3 | | 1 | 2 |
| CO6 | | | | | | | | | 3 | 3 | | | 1 | 2 |

SYLLABUS

| Unit No. | Contents | Mapped CO |
|----------|---|--------------------|
| I | Introduction To Switch Mode Power Converters About Switch Mode Power Conversion, SMPS requirements. Cuk converters - and their principles of operation; continuous and discontinuous modes of operation. | CO2, CO3 CO6 |
| II | Thyristor Commutation Techniques Review of Recent developments in power devices for switch mode power supplies. Selection of devices, Commutation: Load Commutation, Resonant Pulse Commutation, Complementary Commutation, Impulse Commutation, External Pulse Commutation. | CO2, CO3 CO6 |
| III | Transformer-Isolated Converters Single-switch and multi-switch transformer-isolated DC-DC converters. Flyback and forward converters; transformer isolated half-bridge, full- | CO3, CO4 |

| | | |
|----|--|---------------------|
| | bridge converters. Push-pull converters. Voltage fed and current-fed converters. | CO6 |
| IV | Magnetic Component Design Magnetic core materials and performance; basic inductor and transformer design; practical magnetic design; design aspects to be considered for designing transformers for specific applications – flyback, push-pull converters. | CO3, CO4, CO6 |
| V | Switching Regulator Control, Soft-Switched Dc-Dc Power Converters Small-signal models for switching regulators. Performance analysis and design of closed-loop system under different control methods, and operating modes. Measurement of small signal transfer functions. Soft-Switched DC-DC Power Converters -Motivation. Hard-switching vs soft-switching. | CO3 CO5, CO6 |

Learning Resources

Text Books

1. N Mohan, T M Undeland and W P Robbins, "Power Electronics: Converters, Applications and Design", Wiley , 3rd Edition, 2007
2. Abraham Pressman, Keith Billings, Taylor Morey, "Switching Power Supply Design", McGraw-Hill.3rd Edition, 2009

Reference Books

1. K. Kit Sum, Switch Mode Power Conversion: Basic Theory and Design 1st Edition, Kindle Edition,2017

Web Links

1. <https://nptel.ac.in/courses/108108036>