

## IV B.Tech I Semester

**15AEE53-SWITCH MODE POWER CONVERTERS  
(CBCC (DEPARTMENTSPECIFIC))**

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**Course Objectives:**

*This course enables the students to*

- Understand the fundamental concepts of isolated converters
- Know the concepts of selection of controller parameters.
- Understand the importance of half and full bridge converter topologies
- Know the concept of Zero voltage and Current switching
- Understand the concept of fundamental switching regulators i.e Buck and Boost topologies

**UNIT –I SINGLE-SWITCH ISOLATED CONVERTERS**

Requirement for isolation in the switch-mode converters, transformer connection, Forward and fly back converters-power circuit and steady-state analysis.

**Push-Pull Converters:**

Power circuit and steady-state analysis, utilization of magnetic circuits in single switch and push-pull topologies.

**UNIT- II: ISOLATED BRIDGE CONVERTERS**

Half bridge and full-bridge converters, Power circuit and steady-state analysis, utilization of magnetic circuits and comparison with previous topologies.

**Dynamic Analysis Of Dc-Dc Converters:**

Formulation of dynamic equation of buck and boost converters, averaged circuit models, linearization technique, small-signal model and converter transfer functions.

**UNIT-III: CONTROLLER DESIGN**

Review of frequency-domain analysis of linear time-invariant systems, concept of bode plot, phase and gain margins, bandwidth, controller specifications, Proportional (P), Proportional plus Integral (PI), Proportional, Integral plus Derivative controller (PID), selection of controller parameters.

**UNIT-IV: RESONANT CONVERTERS**

Classification of Resonant converters-Basic resonant circuits- Series resonant circuit-parallel resonant circuits- Resonant switches.

**UNIT-V: QUASI-RESONANT CONVERTERS-I**

Concept of Zero voltage switching, principle of operation, analysis of M-type and L-type Buck or boost Converters.

**Quasi-Resonant Converters-II**

Concept of Zero current switching, principle of operation, analysis of M-type and L-type Buck or boost Converters.

V. Sub  
BOS chairman

**Course Outcomes:**

*After completion of the course the student will able to*

- *Understand the Requirement for isolation in the switch-mode converters*
- *Procure knowledge on frequency-domain analysis of linear time-invariant systems*
- *Understand the concepts of half & full bridge converter topologies*
- *Knowledge on the basic operation of Quasi-Resonant Converters*

**TEXT BOOKS:**

1. Robert Erickson and Dragon Maksivimovic, Fundamentals of Power Electronics, Springer Publications.
2. IssaBatarseh, Fundamentals of Power Electronics, John Wiley Publications, 2009.

**REFERENCE BOOKS:**

1. Philip T.Krein Elements of Power Electronics - Oxford University Press, 1997.
2. L. Umanand Power Electronics, Tata Mc-Graw Hill, 2004.

U. J. S.  
Bos chairman

