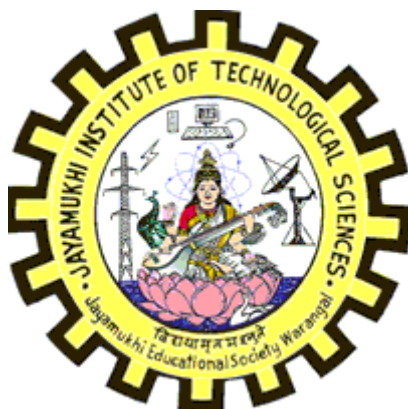


**ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS**

ELECTRICAL & ELECTRONICS ENGINEERING

for
B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2015-2016)

COLLEGE CODE: C4



**JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)**

**Affiliated to Jawaharlal Nehru Technological University Hyderabad
Narasampet, Warangal – 506 332
Telangana State, India**

**JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)**

IV Year B.Tech. II-Sem: EEE

**L T P C
3 0 0 3**

PROFESSIONAL –V

(AJ8237)FUNDAMENTALS OF HVDC AND FACTS DEVICES

Pre- Requisites: To learn this course student should have the concepts on the following subject: Power systems-II, Power Electronics

OBJECTIVES:

1. This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Harmonics and Filters.
2. Reactive power control and Power factor improvements of the system. it also deals with basic FACTS concepts
3. Static shunt and series compensation and combined compensation techniques.

UNIT—I

Introduction: Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of Gratez circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters.

UNIT—II

Converter & HVDC System Control: Principles of DC Link Control — Converters Control Characteristics — system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link.

UNIT-III

Harmonics, Filters and Reactive Power Control: Introduction, generation of harmonics, AC and DC filters. Reactive Power Requirements in steady state, sources of reactive power, static VAR systems.

Power Flow Analysis in AC/DC Systems: Modeling of DC/AC converters, Controller Equations-Solutions of AC/DC load flow —Simultaneous method-Sequential method.

UNIT-IV

Introduction to FACTS: Flow of power in AC parallel paths and meshed systems, basic types of FACTS controllers, brief description and definitions of FACTS controllers.

Static Shunt Compensators: Objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators, SVC and STATCOM, comparison between SVC and STATCOM.

UNIT-V

Static Series Compensators: Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)-power angle characteristics-basic operating control schemes.

Combined Compensators: Introduction, unified power flow controller (UPFC), basic operating principle, independent real and reactive power flow controller, control structure.

TEXT BOOKS:

1. HVDC Transmission, S. Kamakshiah, V. Kamaraju, The Mc — Graw Hill Companies.
2. Understanding FACTS, Concepts and Technology of Flexible AC Transmission Systems, Narain. G. Hingorani, Laszlo Gyugyi, IEEE Press, Wiley India.

REFERENCE BOOKS:

1. HVDC and Facts Controllers Applications of Static Converters in Power Systems, Vijay K. Sood, Kiuwer Academic Publishers.
2. HVDC Power Transmission Systems: Technology and system Interactions, K.R.Padiyar, New Age International (P) Limited.
3. Thyristor — Based Conrollers for Electrical Transmission Systems, R.Mohan Mathur, Rajiv K. Varma.Wiley India.
4. FACTS Modeling and Simulation in Power Networks, Enrique Acha, Wiley India Distributed by BSP Books Pvt. Ltd.

OUTCOMES:

1. After going through this course the student gets a thorough knowledge on, basics of HVDC system.
2. converters control schemes harmonics filters reactive power control and power flow analysis in HVDC systems
3. basic concepts of FACTS, necessity of FACTS controllers and their operation, shunt and series compensation through various static compensators
4. With which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.
