



No./NITRR/EED/2024/2331

Date 10/12/2024

To,

Dean Academics,
NIT Raipur

Sub. : Shifting of the B. Tech VII semester scheme and syllabus "Flexible AC Transmission system" to VI semester.

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I am writing this letter for your kind consideration and approval for the B. Tech VII semester scheme "Flexible AC Transmission system" shift to B. Tech VI semester.

It is requested for your kind approval of shifting above said VII semester subject to VI semester.

Amanika
10/12/2024
Dr. Amanika Yadav
Head and Professor
Electrical Engineering Dept.
NIT, Raipur

Enclosed:-

Scheme and syllabus are attached.

Dean, AA
4818/11/12/24

As discussed in the meeting dated 10.12.2024, it is advised not to make the above changes for current batch, it can however be permitted for incumbent batch of 2025.

Head, Elect. Engg

Chandra
11/10/24

National Institute of Technology Raipur												
Course of Study and Scheme of Examination							B. Tech. 6th Semester				Branch:Electrical	
S. No.	Subject Code	Subject Name	Periods per Week			TA	Examination Scheme				Total Marks	Credits
			L	T	P		MSE/MTR		ESE/ESVE			
							Theory	Prac.	Theory	Prac.		
1	EL106101EL	Power System Protection & Switchgear	3	1	0	20	30	50		100	4	
2	EL106102EL	High Voltage Engineering	3	1	0	20	30	50		100	4	
3	EL106103EL	Electrical Machines-III	3	1	0	20	30	50		100	4	
4	Program Elective (EXX2)		3	0	0	20	30	50		100	3	
5	Program Elective (EXX3)		3	0	0	20	30	50		100	3	
6	Open Elective (0XX2)		3	0	0	20	30	50		100	3	
7	EL106401EL	Power System Protection & Switchgear Labortory	0	0	2	40	20		40	100	1	
8	EL106402EL	High Voltage Engineering Labortory	0	0	2	40	20		40	100	1	

Subject Code	Program Elective (EXX2)
EL106201EL	Advanced Digital Signal Processors for Power Application
EL106202EL	Simulation and Modeling of Electrical Systems
EL106203EL	Advanced Instrumentation
EL106204EL	Power Quality
EL106205EL	System Modelling and Identification
EL106206EL	Extra High Voltage AC Transmission
EL106214EL	Flexible AC Transmission Systems
Subject Code	Program Elective (EXX3)
EL106207EL	Process Control
EL106208EL	Advanced Control System
EL106209EL	Electrical Machine Design
EL106210EL	Advanced Electric Drives
EL106211EL	Power Converter Design
EL106212EL	Industrial Electronics
EL106213EL	Power System Dynamics
Subject Code	Open Elective (0XX2)
EL106301EL	Design of Photovoltaic Systems
EL106302EL	Building Energy Management Systems
EL106303EL	Advanced Digital Signal Processing
EL106304EL	Basics of Electrical Machines
EL106305EL	Design and integration of optical sensors in mechatronic systems
EL106306EL	Introduction to Hybrid and Electric Vehicles

Arjun

Flexible AC Transmission Systems

[6th Semester, Third Year]



Course Description	Credits	Status	Code
Offered by Department	3-0-0, (3)	Program Elective	EL106214EL
Electrical Engineering			

[Pre-requisites: Power Electronics (EL104103EL)]

Course Objectives

To impart the knowledge and tackle the problem of regulatory constraints on the expansion of power transmission network by introduction of high power electronic controllers for regulation of power flow and voltages in the AC transmission network.

Course Content

UNIT 1 Introduction to Flexible AC transmission systems

Introduction of semiconductor devices, Flow of power in AC system, Steady state and dynamic problems in AC systems loading capability, controllable parameters, basic types of FACTS controllers, Flexible AC transmission systems (FACTS) Basic realities & roles.

UNIT 2 Voltage Source Converters (VSC)

Basic concepts of VSC, single-phase full wave bridge converter operation, single phase-leg operation, three-phase full wave bridge converter and its operation, transformer connections for 12-pulse, 24-pulse and 48-pulse operation.

UNIT 3 Current source converters (CSC)

Basic concepts, three-phase CSCs, three-phase full wave rectifier, comparison of VSC and CSC. Static shunt compensators: basic concepts, method of controllable VAR generation, Static VAR compensator, (SVC), application of SVC in power systems.

UNIT 4 Shunt Compensators

Introduction, mathematical model, working of STATCOM, V-I and V-Q characteristics, transient stability enhancement and exchange of real power using STATCOM, comparison of SVC and STATCOM, Merits of hybrid compensators.

UNIT 5 Series Compensators

Objectives of series compensation, variable impedance type series compensation, GTO thyristor controlled series capacitors (GCSC), thyristor controlled series capacitor (TCSC), basic concepts of GCSC and TCSC, static synchronous series compensator (SSSC). Introduction to Unified Power Flow Controller (UPFC).

Course Materials Required

Text: Textbooks

1. Narain G. Hingorani, "Understanding FACTS", Wiley India Pvt. Ltd., 2011.
2. Mathur, R.M. and Verma, R.K, "Thyristor-Based FACTS Controllers for Electrical Transmission Systems", Wiley-IEEE Press, 1st edition, 2002.

Optional Materials: Reference Books

1. Song, Yu, "FACTS for Transmission lines".
2. G.T. Heydt, "Power Quality", Stars in a Circle Publications, Indiana, 1994.
3. T.J.E. Miller, "Static Reactive Power Compensation", Wiley India Pvt. Ltd., 2010.
4. Padiyar. K. R, " FACTS Controllers in Power Transmission and Distribution" New Age Int. Publishers, 2007.

Course Outcomes:

After the completion of the course the student will be able to :

1. Understand transmission bottle necks and the methods to overcome them.
2. Know the method of series and shunt compensation for improvement of power quality.
3. Simulate different FACTS controllers and analyzing their effects.
4. Undertake projects on power quality improvements using FACTS devices.