	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Year of Regulation	**2019-20**
Department	**Electrical Engineering**	Semester	**VI**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE316	**Flexible AC Transmission System**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

		After the completion of the course, the student should be able to:		
Course Objectives	To understand power flow control issues in the transmission line	Course Outcomes	CO1	Understand the basic concept of facts, and its application in solving the power flow issues in transmission line
	To understand the application of FACTS in addressing power flow issues		CO2	Understand and apply the principles of series compensation
	To learn about static shunt and series compensation techniques through FACTS devices		CO3	Understand and apply the principles of shunt compensation
	To learn about combined compensators		CO4	Gather knowledge about UPQC and IPFC

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	2	2	0	1	0	0	0	0	0	0	1	2	1	0
2	CO2	3	3	2	1	1	0	0	0	0	0	0	1	3	2	1
3	CO3	3	3	2	1	1	0	0	0	0	0	0	1	3	2	1
4	CO4	3	3	2	1	1	0	0	0	0	0	0	1	3	2	1

SYLLABUS

No.	Content	Hours	COs
I	FACTS Concepts: Transmission line inter connections, Power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers	**7**	**CO1**

II	Static Shunt Compensation: Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable var generation, variable impedance type static var generators, switching converter type var generators, hybrid var generators. SVC and STATCOM: The regulation and slope transfer function and dynamic performance, transient Stability enhancement and power oscillation damping, operating point control and summary of compensator control.	**11**	**CO1, CO3**
III	Static Series Compensation: Concept of series capacitive Compensation, improvement of transient stability, power oscillation damping, Functional requirements, GTO Thyristor controlled series capacitor (GSC), Thyristor switched series capacitor (TSSC) and Thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.	**10**	**CO1, CO2**
IV	Combined compensators: Unified power flow controller- circuit arrangement, operation and control of UPFC, basic principle of P and Q control, independent active and reactive power flow control. Interline power flow controller- basic operating principles and characteristics, control structure	**8**	**CO4**
Total Hours		**36**	

Essential Readings

1. N. G. Hingorani and L.Guygi, “Understanding FACTS Devices”, IEEE Press Publications, 2nd Edition, 2000.
2. R. M. Mathur, R. K. Varma, “Thyristor – Based Facts Controllers for Electrical Transmission Systems”, Wiley-IEEE Press, 1st Edition, 2000.

Supplementary Readings

3. A. T. John, “Flexible AC Transmission System”, Institution of Electrical and Electronic Engineers (IEEE), 1st Edition, 1999.
4. N. G. Hingorani, L. Gyugyl, “Understanding FACTS Concepts and Technology of Flexible AC Transmission System”, Standard Publishers Delhi, 1st Edition, 2001.