

		National Institute of Technology Meghalaya (An Institute of National Importance)											CURRICULUM					
Programme		Bachelor of Technology in Electrical and Electronics Engineering											Year of Regulation					
Department		Electrical Engineering											Semester			IV		
Course Code	Course Name	Credit Structure				Marks Distribution												
		L	T	P	C	INT	MID	END	Total									
EE 202	Power System I	3	1	2	5	50	50	100	200									
Course Objectives	To make the students familiar with generation, transmission & distribution of the electrical energy.	Course Outcomes	CO1	Understand the general structure of generation, transmission and distribution.														
	To understand the technical and economic aspects of the electrical systems.		CO2	Analysis of mechanical as well as electrical design aspects of overhead transmission lines.														
			CO3	Enable the students to analyse the different transmission and distribution network models.														
			CO4	Understand the detailed constructions of underground cable and transients in power systems.														
			CO5	Impart the concept of tariff and the necessity of power factor improvement.														
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	3	2	1	2	0	1	0	0	0	0	1	3	0	0		
2	CO2	3	3	3	2	2	0	1	1	0	0	0	1	3	0	0		
3	CO3	3	3	3	2	1	0	0	1	0	0	0	1	3	0	0		
4	CO4	3	3	3	1	0	0	0	0	0	0	0	1	3	0	0		
5	CO5	3	3	2	1	1	0	0	1	0	0	0	1	2	0	0		
6	CO6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
SYLLABUS																		
No.	Content													Hours	COs			
I	Generating Power Stations: Introduction of different types of power generation, Power scenario in India, Plant layout and operation of Thermal, Gas turbine based, Hydro-electric & Nuclear power plants, Renewable generations, Economics of Power generation, Tariff, Power factor and its effect on system economy, Power factor improvement, Deregulation.													05	CO1 CO5			
II	Representation of Power System Network: Introduction and basic structure of power system, Single line diagram, different types of supply system and their comparison, High voltage transmission, Economic choice of voltage and conductor size, Introduction to Per Unit Quantities.													05	CO1 CO3			
III	Distribution of Electric Power: Introduction, Structure, Types of D.C distributors, D.C distribution calculations, A.C distributor, fed at one and fed at both the ends with concentrated loads and uniformly distributed loads, ring distributors with interconnector, current distribution in three wire and four wire ac systems, overview of distribution automation.													07	CO1 CO3			
IV	Mechanical Design of Overhead Lines: Introduction, Different components of overhead transmission lines, string efficiency, methods of improving string efficiency, Phenomenon of Corona, Corona loss, Introduction to sag and tension, Calculation of sag and tension, consideration of ice & wind loading, spacing and clearances.													07	CO2 CO3			
V	Parameters of Transmission Lines Introduction and basic theory, calculation of line resistance, inductance and capacitance for simple arrangements and multi-circuit lines, concept of self GMD and mutual GMD, bundled conductor, spacing of conductors, equivalent spacing, symmetrical and unsymmetrical spacing, transposition for single and double circuit, skin and proximity effects, Effect of earth on capacitance calculation.													07	CO2 CO3			
VI	Characteristics and Performance of Transmission Lines Introduction, Short and medium transmission lines, Charging currents, Calculation by nominal-T, nominal- π and end-condenser method, Regulation and efficiency, Concept of ABCD parameters, Ferranti effect, Modelling of long transmission line, Rigorous solution to long transmission line, evaluation of ABCD constants, interpretation of long line equation, Surge impedance and surge impedance loading, Equivalent circuit of a long transmission line, Power flow through a transmission line, Circle diagrams.													05	CO2 CO3			
VII	Underground Cables Introduction, cable construction, classification of cables, insulation resistance of a single core cable, capacitance and dielectric stresses in a single core cable, most economical conductor size in a cable, grading of cables, capacitance grading/Dielectric grading, inter-sheath grading, limitations of grading, Cable capacitance, charging or capacitive current, capacitance of three core cable and measurements of capacitances.													04	CO4			
VIII	Transients in Power Systems Introduction, Circuit closing transient, Sudden symmetrical short circuit of alternator, Recovery transient due to removal of short circuit, Travelling waves on transmission lines, Wave equations, Arcing grounds, Line design based on direct strokes, Surge arrestors Insulation coordination.													05	CO4			
Total Hours													45					
Essential Readings																		
1. I.J Nagrath & D.P. Kothari, "Modern Power System Analysis", Tata McGraw Hill, 4th Edition, 2011.																		
2. C.L. Wadhwa, "Electric Power System", New Age International Publishers, 6th Edition, 2010.																		
3. W. D. Stevenson, "Element of Power System Analysis", McGraw Hill, 4th Edition, 1982.																		

4. C.L Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", New Age International, 4th Edition, 2018.

Supplementary Readings

1. Ashfaq Hussain, "Electric Power Systems", CBS Publisher & Distributors, 5th Edition, 2017.

2. Arun Ingole, "Power Transmission and Distribution", Pearson, 1st Edition, 2018.

3. Luces m. Faulkenberry & Walter Coffey, "Electric Power Distribution and Transmission", Pearson, 2nd Edition, 2007.

4. S.N. Singh, Electric Power Generation, Transmission and Distribution, Prentice Hall India Pvt., Limited, 2nd Edition 2008.

5. S.L Uppal & S.Rao, "Electrical Power Systems", Khanna Publishers, 15th Edition, 2018