

<b>TRANSMISSION AND DISTRIBUTION (Core Subject)</b> <b>B.E., IV Semester, Electrical and Electronics Engineering [As per Choice Based Credit System (CBCS) scheme]</b>			
Course Code	17EE43	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03
<b>Credits - 04</b>			
<b>Course Objectives:</b>			
<ul style="list-style-type: none"> <li>• To understand the concepts of various methods of generation of power.</li> <li>• To understand the importance of HVAC, EHVAC, UHVAC and HVDC transmission.</li> <li>• To design insulators for a given voltage level.</li> <li>• To calculate the parameters of the transmission line for different configurations and assess the performance of the line.</li> <li>• To study underground cables for power transmission and evaluate different types of distribution systems.</li> </ul>			
<b>Module-1</b>			<b>Teaching Hours</b>
<p><b>Introduction to power system:</b> Structure of electric power system: generation, transmission and distribution. Advantages of higher voltage transmission: HVAC, EHVAC, UHVAC and HVDC. Interconnection. Feeders, distributors and service mains.</p> <p><b>Overhead transmission lines:</b> A brief introduction to types of supporting structures and line conductors-Conventional conductors; Aluminium Conductor steel reinforced (ACSR), All – aluminium alloy conductor (AAAC) and All –aluminium conductor (AAC). High temperature conductors; Thermal resistant aluminium alloy (ATI), Super thermal resistant aluminium alloy (ZTAI), Gap type thermal resistant aluminium alloy conductor steel reinforced (GTACSR), Gap type super thermal resistant aluminium alloy conductor steel reinforced (GZTACSR). Bundle conductor and its advantages. Importance of sag, Sag calculation – supports at same and different levels, effect of wind and ice. Line vibration and vibration dampers. Overhead line protection against lightning; ground wires.</p> <p><b>Overhead line Insulators:</b> A brief introduction to types of insulators, material used- porcelain, toughened glass and polymer (composite). Potential distribution over a string of suspension insulators. String efficiency, Methods of increasing string efficiency. Arcinghorns. ■</p>			<b>10</b>
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding.		
<b>Module-2</b>			
<p><b>Line parameters:</b> Introduction to line parameters- resistance, inductance and capacitance. Calculation of inductance of single phase and three phase lines with equilateral spacing, unsymmetrical spacing, double circuit and transposed lines. Inductance of composite – conductors, geometric mean radius (GMR) and geometric mean distance (GMD). Calculation of capacitance of single phase and three phase lines with equilateral spacing, unsymmetrical spacing, double circuit and transposed lines. Capacitance of composite – conductor, geometric mean radius (GMR) and geometric mean distance (GMD). Advantages of single circuit and double circuit lines. ■</p>			<b>10</b>
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying.		
<b>Module-3</b>			
<p><b>Performance of transmission lines:</b> Classification of lines – short, medium and long. Current and voltage relations, line regulation and Ferranti effect in short length lines, medium length lines considering Nominal T and nominal <math>\pi</math> circuits, and long lines considering hyperbolic form equations. Equivalent circuit of a long line. ABCD constants in all cases. ■</p>			<b>10</b>
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying, L <sub>4</sub> – Analysing.		
<b>Module-4</b>			
<p><b>Corona:</b> Phenomena, disruptive and visual critical voltages, corona loss. Advantages and disadvantages of corona. Methods of reducing corona.</p>			<b>10</b>

B.E ELECTRICAL AND ELECTRONICS ENGINEERING (EEE) CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER -IV				
17EE43 TRANSMISSION AND DISTRIBUTION (Core Subject) (continued)				
Module-4 (continued)				Teaching Hours
<b>Underground cable:</b> Types of cables, constructional features, insulation resistance, thermal rating, charging current, grading of cables – capacitance and inter-sheath. Dielectric loss. Comparison between ac and dc cables. Limitations of cables. Specification of power cables. ■				
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying, L <sub>4</sub> – Analysing.			
Module-5				
<b>Distribution:</b> Primary AC distribution systems – Radial feeders, parallel feeders, loop feeders and interconnected network system. Secondary AC distribution systems – Three phase 4 wire system and single phase 2 wire distribution, AC distributors with concentrated and uniform loads. Effect of disconnection of neutral in a 3 phase four wire system. <b>Reliability and Quality of Distribution system:</b> Introduction, definition of reliability, failure, probability concepts, limitation of distribution systems, power quality, Reliability aids. ■				<b>10</b>
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying, L <sub>4</sub> – Analysing.			
<b>Course Outcomes:</b> At the end of the course the student will be able to:				
<ul style="list-style-type: none"> <li>• Explain the concepts of various methods of generation of power.</li> <li>• Explain the importance of HVAC, EHVAC, UHVAC and HVDC transmission.</li> <li>• Design and analyze overhead transmission system for a given voltage level.</li> <li>• Calculate the parameters of the transmission line for different configurations and assess the performance of line.</li> <li>• Explain the use of underground cables and evaluate different types of distribution systems.</li> </ul>				
<b>Graduate Attributes (As per NBA)</b> Engineering Knowledge, Problem Analysis, Design / development of solutions, Engineers and society, Ethics.				
<b>Question paper pattern:</b>				
<ul style="list-style-type: none"> <li><input type="checkbox"/> The question paper will have ten questions.</li> <li><input type="checkbox"/> Each full question is for 16 marks.</li> <li><input type="checkbox"/> There will be 2 full questions (with a maximum of four sub questions in one full question) from each module.</li> <li><input type="checkbox"/> Each full question with sub questions will cover the contents under a module.</li> <li><input type="checkbox"/> Students will have to answer 5 full questions, selecting one full question from each module. ■</li> </ul>				
<b>Text Books:</b>				
1	A Course in Electrical Power	Soni Gupta and Bhatnagar	Dhanpat Rai	-
2	Principles of Power System	V.K. Mehta, Rohit Mehta	S. Chand	1 <sup>st</sup> Edition 2013
<b>Reference Books:</b>				
3	Power System Analysis and Design	J. Duncan Glover et al	Cengage Learning	4th Edition 2008
4	Electrical power Generation, Transmission and Distribution	S.N. Singh	PHI	2 <sup>nd</sup> Edition, 2009
5	Electrical Power	S.L. Uppal	Khanna Publication	
6	Electrical power systems	C. L. Wadhwa	New Age	5 <sup>th</sup> Edition, 2009
7	Electrical power systems	Ashfaq Hussain	CBS Publication	
8	Electric Power Distribution	A.S. Pabla	McGraw-Hill	6 <sup>th</sup> Edition, 2012
For High temperature conductors refer <a href="http://www.jpowers.co.jp/english/product/pdf/gap_c1.pdf">www.jpowers.co.jp/english/product/pdf/gap_c1.pdf</a> and <a href="#">Power System Analysis and Design, J. Duncan Glover et al</a>				