

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**  
**COURSE CURRICULUM**

**Course Title: TRANSMISSION AND DISTRIBUTION OF  
ELECTRICAL POWER  
(Code: 3340902)**

<b>Diploma Programmes in which this course is offered</b>	<b>Semester in which offered</b>
<b>Electrical Engineering</b>	<b>4<sup>th</sup> Sem</b>

**1. RATIONALE**

Today the electricity is the basic need of human being as well as every industries. The transmission and distribution of electrical power is also equally important. The power industries and power station required technician to distribute electrical energy to the consumer economically. The technician should be also able to work independently in the various area of transmission and distribution system. He should be able to operate various control equipments independently in normal and abnormal conditions. Essential efforts are made in this course to develop above skills in the students.

**2. COMPETENCY**

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Troubleshoot various transmission & distribution system.

**3. Course Outcomes:**

- 1. Differentiate various types of transmission & distribution systems.**
- 2. Identify various components & Know their functions.**
- 3. Calculate voltage regulation & efficiency of transmission system.**
- 4. Calculate voltage drop of distribution system.**

**4. Teaching and Examination Scheme**

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	
4	2	1	7	70	30	20	30	150

**Legends:** L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit ESE - End Semester Examination; PA - Progressive Assessment.

## 5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
<b>Unit – I TRANSMISSION LINE COMPONENTS.</b>	<p>1. a Classify &amp; compare different transmission systems.</p> <p>1.b Identify and select appropriate transmission line components.</p>	<p>1.1 Introduction to transmission.</p> <p>1.2 Necessity of transmission of electricity.</p> <p>1.3 Classification &amp; comparison of different types of transmission systems.</p> <p>1.4 Introduction to line components.</p> <p>1.5 Types of conductors-Copper, Aluminum &amp; state their trade names.</p> <p>1.6 Solid, stranded &amp; bundled conductors.</p> <p>1.7 Line supports – requirements, types, and field of applications.</p> <p>1.8 Line insulators – requirements, types, and field of applications.</p> <p>1.9 Failure of insulator &amp; reasons of Failure.</p> <p>1.10 Distribution of potential over a string of suspension insulators.</p> <p>1.11 Concept of string efficiency, methods of improving string efficiency.</p> <p>1.12 Corona – corona formation, advantages &amp; disadvantages, factors affecting corona, important terms related to corona.</p> <p>1.13 Spacing between conductors.</p> <p>1.14 Calculation of span length &amp; sag calculation ( Numerical based on 1.10 , 1.11 &amp; 1.14)</p>
<b>Unit– II PERFORMANCE OF TRANSMISSION LINE</b>	<p>2. a Explain the effects of R, L &amp; C on 1-ph &amp; 3-ph transmission line.</p> <p>2.b Evaluate performance of different transmission lines.</p>	<p>2.1 Skin effect, proximity effect &amp; Ferranti effect.</p> <p>2.2 Concept of transposition of conductors &amp; its necessity.</p> <p>2.3 Classification of transmission lines.</p> <p>2.4 Losses, efficiency &amp; regulation of line.</p> <p>2.5 Performance of single phase short transmission line.(Numerical based on it )</p> <p>2.6 Effect of load power factor on performance.</p> <p>2.7 Medium transmission lines-End condenser, Nominal T &amp; Nominal pi</p>

Unit	Major Learning Outcomes	Topics and Sub-topics
		network with vector diagram. 2.8 Compensation of Transmission Lines- (Introduction Shunt-Series) 2.9 Need and working of LDC
<b>Unit-III EHV TRANSMISSION</b>	3. a. Explain Advantages, Limitations of EHV transmission and FACTS.	3.1 Introduction & requirement of EHV transmission. 3.2 EHV AC Transmission, reasons for adoption & limitations. 3.3 HVDC Transmission – advantages, limitations. 3.4 Introduction, Requirements of FACTS devices, classification of FACTS Devices
<b>Unit-IV COMPONENTS OF DISTRIBUTION SYSTEM</b>	4. a. Classify various distribution systems 4. b. Differentiate various connection schemes & list requirements of distribution system. 4.c Describe the Impact of Distributed Generation Integrated to distribution Grid.	4.1 Introduction. 4.2 Classification of distribution system. 4.3 A.C distribution. 4.4 Connection schemes of distribution system. 4.5 Requirements of distribution systems. 4.6 Design consideration. 4.7 A.C. distribution calculations. 4.8 Methods of solving A.C.-1 phase & 3 $\emptyset$ –phase connected (balanced) distribution system. (Numerical based on 1-ph & 3-ph balanced distribution system) 4.9 Issues of Distributed Generation Integrated to distribution Grid.
<b>Unit-V SUB-STATION</b>	5. a. Identify connection diagram and layout of sub-stations.	5.1 Introduction. 5.2 Classification. 5.3 Advantages & Disadvantages. 5.4 Selection & location of site. 5.5 Main connection schemes. 5.6 Substation Equipments. 5.7 Busbar arrangement.
<b>Unit-VI CABLES</b>	6. a. Select & test cables as per IS /data sheet /catalogue.	6.1 Classification of cables normally used in distribution system. 6.2 Construction of cables. 6.3 selection of cables as per IS /data sheet / catalogue.

## 6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	TRANSMISSION LINE COMPONENTS.					
II	PERFORMANCE OF TRANSMISSION LINE					
III	EHV TRANSMISSION					
IV	COMPONENTS OF DISTRIBUTION SYSTEM					
V	SUB-STATION					
VI	CABLES					
<b>Total</b>						

**Legends:** R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

## 7. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain*

S. No.	Unit No.	Practical/Tutorial Exercises (Outcomes' in Psychomotor Domain)	Hrs. required
1	I	Solve the problem to find out constants of transmission line for given data	02
2	I	Solve problems on string efficiency.	02
3	I	Solve problems on sag	02
4	I	Demonstrate the transmission line Insulators and supporting structure and prepare a report.	02
5	I	Visit to nearby cable industries and classify cables normally used in distribution System.	02
6	II	Prepare Technical Report after visit to the LDC.	02
7	II	Solve the numerical based on performance of short transmission line.	02
8	II	Solve the numerical based on performance of medium transmission line.	02
9	III	Solve the numerical based on single phase distribution system	02
10	VI	Classify the different types of distribution system.	02
11	IV	Describe the impact of Distributed Generation Integrated to distribution Grid.	02
12	V	Given the Blue Print of Sub-Station, Interpret it.	02
13	V	Visit local substation	04
<b>Total</b>			<b>28</b>

## 8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- 1 Visit 66 kv distribution sub-station and draw line diagram with equipment specifications
- 2 Visit 132/220/400 kv transmission sub-station and draw line diagram with equipment specifications.

## 9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

## 10. SUGGESTED LEARNING RESOURCES

### A) List of Books

S. No.	Title of Book	Author	Publication
1.	Electric Power Transmission and Distribution	S. Sivanagaraju S. Satyanarayana	Pearson
2.	A Course in electrical Power	Soni-Gupta-Bhatnagar	Dhanpat Rai
3.	Principals of power system	V. K. Mehta	S. Chand & Company
4.	A Course in electrical	S. L. Uppal.	S. K. Khanna

	power		
5.	Transmission & distribution of electrical energy	J. B. Gupta	S. K. Khanna
6.	Electrical Power System	C. L. Wadhwa	New Age

**B) List of Major Equipment/ Instrument with Broad Specifications**

**C) List of Software/Learning Websites**

## **11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**

### **Faculty Members from Polytechnics**

1. Prof. A. A. AMIN , G.P., VADNAGAR
2. Prof. S. V. JAGANI, G.P., DAHOD
3. Prof. V. S. TEJWANI, G.P., RAJKOT
4. Prof. N. N. PANDYA, G.P., AHMEDABAD

### **Coordinator and Faculty Members from NITTTR Bhopal**

1. Prof. (Mrs.) Susan S. Mathew
2. Dr. Joshua Earnest,