Lok Jagruti Kendra University
University with a Difference

Diploma
in
Electrical Engineering

Course Code: 025070303
Generation, Transmission & Distribution

Programme / Branch Name	Diploma in Electrical Engineering					
Course Name	Generation, Transmission & Distribution				**Course Code**	025070303
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**Total Marks**
3	0	2	4	50	50	50	150

Legends: L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisite

- ✓ Physics and Environmental Science (Pre-university level)
- ✓ Measure basic electrical quantities/parameters
- ✓ Use major electrical/electronic machines//instrument/equipment

3. Rationale

The majority of the diploma pass outs who get employment in State Electricity Boards have to perform various activities in the field of generation, transmission and distribution of electrical power. The range of these activities vary from simple operation and maintenance of equipment, lines, fault location, planning and designing of simple distribution schemes, executive and supervisory control in power stations, transmission and distribution networks in addition to administrative jobs including public relations. They should also be made aware of recent developments, current practices in the electricity departments, corporations and boards to keep them abreast with modern techniques in generation of electrical power.

4. Objectives

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

- ✓ Understand the working of different power plants.
- ✓ To develop the basic cognitive skills required to take appropriate decisions to maintain the various generating and auxiliary equipments of power plants.
- ✓ Interpret the normal operation of the electric transmission and distribution systems.
- ✓ Maintain the functioning of the medium and high voltage transmission system.
- ✓ Maintain the functioning of the low voltage AC distribution system.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcome	% Weightage	Hours
1	**Generating Stations**	1.1. Introduction to Generating Stations 1.2. Thermal Power Station 1.3. Schematic Arrangement of Thermal Power Station 1.4. Site Selection of Thermal Power Station 1.5. Major Equipments of a Thermal Power Plant 1.6. Hydro-electric Power Station 1.7. Schematic Arrangement of Hydro-electric Power Station 1.8. Site Selection of Hydro-electric Power Station 1.9. Elements of Hydro-electric Power Station 1.10. Diesel Power Station 1.11. Schematic Arrangement of Diesel Power Station 1.12. Nuclear Power Station 1.13. Schematic Arrangement of Nuclear Power Station 1.14. Site Selection of Nuclear Power Station 1.15. Gas Turbine Power Plant 1.16. Schematic Arrangement of Gas Turbine Power Plant 1.17. Comparison of Various Power Plants	• Thermal Power Plant • Hydro-electric Power Plant • Diesel Power Plant • Nuclear Power Plant • Gas Turbine Power Plant	30	12
2	**Introduction to Transmission System & its Components**	2.1 Introduction about Transmission System. 2.2 Position of Transmission System in Power Supply System. 2.3 Elements of Transmission System 2.4 Conductors used in Overhead Transmission Line. 2.5 Line Supports used in Overhead Transmission Line. 2.6 Insulators used in Overhead Transmission	• About Transmission System. • Different Components of Transmission System. • String Efficiency and Methods of Improving it. • Sag Calculation.	20	8

		Line. 2.7 Sting Efficiency and Methods of improving String Efficiency 2.8 Sag and Calculation of Sag.			
3	**HVDC Transmission & FACTS Technology**	3.1 Advantages and Disadvantages of HVDC Transmission. 3.2 Types of HVDC System. 3.3 Main Components of HVDC Transmission. 3.4 Interconnection of HVDC Transmission into AC Systems. 3.5 Introduction about Flexible AC Transmission System (FACTS) Technology. 3.6 Objectives of FACTS. 3.7 Basic Types of FACTS Controllers. 3.8 FACTS Devices.	• About HVDC Transmission System. • Advantages and Disadvantages of HVDCT. • Components of HVDCT. • FACTS Basics. • Objectives and Types of FACTS. • FACTS Devices	10	6
4	**Introduction to Distribution System & its Components**	4.1 Introduction about Distribution System. 4.2 Position of Distribution System. 4.3 Importance of Distribution System in Power Supply System. 4.4 Classification of Distribution System. 4.5 Comparison of Primary and Secondary Distribution System. 4.6 Feeder, Distributor and Service Mains. 4.7 Requirements of Distributor System. 4.8 Methods of Feeding Primary Distributor. 4.9 Methods of Feeding Secondary Distributor. 4.10 Design Considerations of Distribution System. 4.11 Distributed Generation Integrated to Distribution Grid.	• Importance of Distribution System. • Classification of Distribution System. • Feeder, Distributor and Service Mains. • Methods of Feeding Primary and Secondary Distributor. • Design of Feeder and Distributor. • Distributed Generation.	20	8
5	**Substation and Underground**	5.1 Introduction to Substation.	• About Substation and	20	8

	Cables	5.2 Classification of Substation 5.3 Comparison Between Indoor and Outdoor Type Substations. 5.4 Equipments and Control Equipments in Substation. 5.5 Layout and Busbar Arrangement in Substation. 5.6 Key Diagram of Substation using Single Busbar and Double Busbar System. 5.7 Introduction to Underground Cables. 5.8 Comparison of Overhead Line and Underground Cable. 5.9 Major Requirements of Underground Cables. 5.10 General Construction, Classification, Types and Ratings of Cable. 5.11 Selection of Cable Size as per IS. 5.12 Use of Different Types of Cables and Methods of Laying Cables.	Classification of Substation. • Equipments, Layout and Busbar Arrangement of Substation. • Requirements of Underground Cables. • Construction, Classification and Types of UG Cables. • Cable Laying Methods.		

Total Hours 42

6. List of Practical's / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No	Practical / Exercises	Key Competency	Hours
1	To study about different Generating Stations.	Generating Stations.	4
2	To study about Transmission System and its types.	Transmission System.	2
3	To study about types of transmission Line Supports.	Line Supports.	2
4	To Study about Line insulators in transmission system.	Line Insulators.	2
5	To study about String efficiency and Calculation of String Efficiency.	String Efficiency.	2
6	To study about Sag and Calculation of Sag.	Sag Calculation	2
7	To study about HVDC Transmission System.	HVDC Transmission.	2
8	To study about FACTS Devices.	FACTS Devices.	2

9	To study about A.C. Distribution System.	A.C. Distribution System.	2
10	To study about Sub-Station.	Sub-station.	2
11	To study about Underground Cables.	Underground Cables.	2

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1	Generating Stations	30	40	10	10	5	5
2	Introduction to Transmission System & its Components	40	20	10	5	5	10
3	HVDC Transmission & FACTS Technology	30	30	10	10	10	10
4	Introduction to Distribution System & its Components	20	30	20	5	5	20
5	Substation and Underground Cables	40	20	10	10	10	10

Legends: R - Remembering App – Applying E- Evaluating
U - Understanding C – Creating An- Analyzing

8. Textbooks

1) Principles Power System by V. K. Mehta and Rohit Mehta, S. Chand and Company Ltd., Latest Edition
2) Electrical Power Generation, Transmission and Distribution by S.N. Singh, PHI Learning, Latest Edition

9. Reference Books

1) Electrical Power Generation by Dr. Tanmoy Deb, Khanna Book Publishing Co.(P) Ltd., Latest Edition
2) Generation of Electrical Energy by B. R. Gupta, Eurasia Publishing House (Pvt.) Ltd., Latest Edition
3) Electric Power Transmission and Distribution by S. Sivanagaraju and S. Satyanarayana, Pearson Education, Latest Edition
4) Transmission and Distribution of Electrical Power by J.B. Gupta, S.K. Khanna Publications, Latest Edition
5) Electric Power Transmission and Distribution by S. Rama Subbanna and B Loveswara Rao, Notion Press, Latest Edition
6) Electrical Power System by C.L. Wadhwa, New Age Publication, Latest Edition
7) Power Transmission and Distribution by Arun Ingole, Pearson Education, Latest Edition
8) Generation and Utilization of Electrical Energy by S. Sivanagaraju, M. Balasubba Reddy, D. Srilatha, Pearson, Latest Edition
9) Electricity Power Generation by Digambar M. Tagare, IEEE Press, A John Wiley & Sons Inc. Publication, Latest Edition
10) Power Generation Technologies by Paul Breeze, Newnes, Oxford, Latest Edition

10. Open Sources (Website, Video, Movie)

1) https://www.electrical4u.com/
2) https://www.ntpc.com/
3) https://www.nhpcindia.com/
4) https://www.powergridindia.com/
5) https://www.npcil.nic.in/
6) https://www.nise.res.in/
7) https://www.nibe.res.in/
8) http://mnre.gov.in/file-manager/grid-wind/guideline-wind/
9) http://mnre.gov.in/schemes/new-technologies/geothermal/
10) https://www.nptelvideos.in/electrical power
11) https://enwikipedia.org/wiki/Electric_power_transmission
12) https://www.powergridindia.com/