

Program : Diploma in Electrical and Electronics Engineering	
Course Code : 5032	Course Title: Electricity Generation, Transmission & Distribution
Semester : 5	Credits: 4
Course Category: Program Core	
Periods per week: 4 (L:3 T:1 P:0)	Periods per semester: 60

Course Objectives:

- To introduce students to the electricity generation plants and their economics.
- To familiarize students with the functioning of the electrical transmission and distribution system. _____

Course Prerequisites:

Topic/Description	Course code	Course Title	Semester
Basics of Electrical Engineering		Fundamentals of Electrical & Electronics Engineering	2

Course Outcomes

On completion of the course, the students will be able to:

CO _n	Description	Duration (Hours)	Cognitive Level
CO1	Identify the operation of various generating systems and calculate the quantity of electricity generated	14	Applying
CO2	Choose methods to improve power factor and list various tariffs	15	Applying
CO3	Identify various power transmission schemes and calculation of sag on conductors	15	Applying
CO4	Summarize various electrical power distribution Systems	14	Understanding
	Series Test	2	

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	3						
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	Identify the operation of various generating systems and calculate the quantity of electricity generated		
M1.01	Illustrate various electric power generating schemes	6	Understanding
M1.02	Outline the criterion for selection of sites	2	Understanding
M1.03	Solve problems to calculate the quantity of electricity generated for hydel power plants	3	Applying
M1.04	Summarize the concept of distributed generation and interconnected grid systems	3	Understanding
<p>Contents:</p> <p>Generation of electricity- Classification of energy sources - examples –generation of electricity-commercial and non commercial- methods -schematic layout - working - comparisons -hydroelectric - thermal (coal, gas, diesel and nuclear)</p> <p>Selection of sites - criterion for selection of sites</p> <p>Quantity of electricity generated- calculation of quantity of electricity generated for hydel power plants- equations- problems</p> <p>Grid connected systems-basic concept- advantages-interconnected grid systems-distributed generation – microgrid</p>			
CO2	Choose methods to improve power factor and list various tariffs		
M2.01	Identify the importance of load curve of a power station	5	Applying
M2.02	List various costs of power generation	2	Remember
M2.03	Select suitable capacitor to improve power factor	4	Applying
M2.04	Interpret various electricity tariff schemes and solve problems	4	Applying
	Series Exam 1	1	

Contents :

Variable load on power stations - basic concepts-diagrams-load curve-load duration curve -base load - peak load -importance of load curve

definitions - equations- connected load -average demand - maximum demand- load factor - diversity factor -problems-units generated per annum -equation- problems

Various costs of power generation- concept- definitions-fixed cost-semi fixed cost-running cost

Power factor - power triangle -disadvantages of low power factor -power factor improvement-methods -static capacitors(using vector diagrams)-synchronous condenser-phase advancers-power factor correction using capacitors- equation- problems

Tariff – definitions-objectives - types - simple - flat rate - block rate - two part - three part-maximum demand tariff - power factor tariff - problems. basic concepts -availability based tariff (ABT) - time of day (TOD) tariff.

CO3	Identify various power transmission schemes and calculation of sag on conductors		
M3.01	Explain various power transmission schemes and its components	3	Understanding
M3.02	Identify the importance of sag and tension in overhead conductors	6	Applying
M3.03	Outline the various effects on the performance of transmission lines	3	Understanding
M3.04	<i>Summarize various</i> long distance transmission systems	3	Understanding

Contents:

Electric transmission systems-types-basic concept-primary transmission-secondary transmission -ac transmission-dc transmission

Overhead transmission lines –classifications -standard transmission voltages in India-main components - line supports - requirements- conductors-types-properties-important terms-definition-line losses-voltage regulation-transmission efficiency-economical transmission voltage

Sag in overhead line-definition-diagrammatic representation- significance of sag-calculations of sag and tension when supports are at equal and unequal levels(equation only)-problems

Transmission line phenomena-Transposition of conductors and its necessity-basic concepts-skin effect - proximity effect - Ferranti effect - Corona.

Long distance transmission- concept- necessity - advantages - limitations.-EHV-HVDC-FACT

CO 4	Summarize various electrical power distribution systems		
M4.01	Classify various distribution schemes	4	Understanding
M4.02	Summarize various types of insulators	4	Understanding
M4.03	Explain the construction of underground cables and methods of laying	3	Understanding

M4.04	Illustrate the single line diagram of a typical substation	3	Understanding
	Series Exam 2	1	

Contents:

Distribution systems- basic components - feeder- distributor -service mains -various distribution schemes-layout-advantages - disadvantages-radial - ring main - interconnected.

DC distribution systems-schemes- basic concepts - diagram- distributor fed at one end- both ends-centre-ring distributor

AC distribution systems- single line diagram- factors to be considered in design of feeder and distributor.

Requirements of an ideal distribution system

Line Insulators - properties - types (basic sketch only)- causes of insulator failure-string efficiency- expression of string efficiency for a string of three suspension insulators - methods of improving string efficiency.

Underground cables - requirements - basic construction- classification -comparison with overhead conductors - cable laying-methods-basic idea - direct-draw in-solid system - importance of grading.

Substations - classification - single line diagram of a typical substation - symbols and functions of various components.

Text / Reference:

T/ R	Book Title/Author
T1	<i>V.K. Mehta, Rohit Mehta, Principles of Power System, S. Chand and Co. New Delhi</i>
R2	<i>Soni; Gupta; Bhatnagar, A Course in Electrical Power, Dhanpat Rai and Sons New Delhi</i>
R3	<i>J.B. Gupta, A Course in Power Systems, S.K. Kataria and sons, New Delhi, ISBN:9788188458523</i>
R4	<i>Sivanagaraju S.; Satyanarayana S., Electrical Power Transmission and Distribution, Pearson Education New Delhi, ISBN:9788131707913</i>
R5	<i>Ned Mohan, Electrical Power System: A First Course, Wiley India Pvt. Ltd. New Delhi,</i>

Online resources

Sl.No	Website Link
1	https://www.gotpower.com/brownouts-and-blackouts/
2	https://www.nptel.ac.in/
3	https://www.youtube.com/watch?
4	https://nptel.ac.in/courses/108/102/108102047/
5	https://nptel.ac.in/content/storage2/courses/108105053/pdf/L-02