

COURSE TITLE	POWER SYSTEM-I
COURSE CODE	01EE1401
COURSE CREDITS	4

Objective:

- 1 To inculcate knowledge about various power generating stations, distribution system, design of transmission lines, underground cables and substation layout.
- 2 To inculcate knowledge about various power generating stations, distribution system and transmission system, substation and underground cable

Course Outcomes: After completion of this course, student will be able to:

- 1 Explain the working principles of various power generating stations and describe the key stages of a power supply system.
- 2 Determine mechanical and electrical parameters of transmission line.
- 3 Analyze the AC and DC distribution system.
- 4 Calculate the key electrical parameters for underground cables.
- 5 Describe the layout of substation

Pre-requisite of course:None

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Generation of Electric Power Brief description of Thermal, hydro, nuclear and gas power plants & other non-conventional power plants, Legal aspects of electricity supply-Electricity acts, rules and codes., Standards followed in power supply, environmental and safety measures, Factors influencing tariffs, types of consumers, and different types of tariffs.	6
2	Supply Systems Typical A.C. Power Supply Schem, Comparison of D.C. and A.C. Transmission,, Advantages of High Transmission Voltage, Various Systems of Power Transmission,	8
3	Mechanical Design of Transmission Line Main components of overhead lines, Conductor materials, Line supports,, insulators, Types of insulators,, Potential distribution over suspension insulators, , String efficiency, Methods of improving string efficiency, , Sag in overhead lines and sag calculations.	7

Contents : Unit	Topics	Contact Hours
4	Inductance and Resistance of Transmission Line Introduction, Definition of Inductance, Flux Linkages of an isolated current carrying conductor,, Inductance of a single phase two wire line, Conductor types, Flux Linkages of one conductor in group, Inductance of composite conductor lines, Inductance of three phase lines, Bundled conductors, Resistance, Skin effect and Proximity effect.	8
5	Capacitance of Transmission Lines Introduction, Electric field of a long straight conductor,, Potential difference between two conductors of a group of parallel conductors,, Capacitance of a two-wire line, Capacitance of a three phase line with equilateral spacing,, Effect of earth on transmission line capacitance, Method of GMD, Bundled conductors.	6
6	Distribution System Distribution system, classification of Distribution systems, Connection scheme of distribution system, Types of DC distributors, DC distribution calculations, , DC distributor fed at one end, uniformly loaded distributor fed at one end, distributor fed at both ends,, Distributor with both concentrated and uniform loading, Ring distributor, Ring main distributors with interconnector, AC distribution calculations, Methods of solving AC distribution problems.	6
7	Underground cables Introduction, Construction of cables, Classification of cables, , Grading of cables, insulation resistance of a cable,, Capacitance of a single core and three core cables, most economical conductor size in a cable,, Overhead lines versus underground cables.	6
8	Distribution substation Sub-Station, Classification of sub-stations, Comparison between outdoor and indoor sub-stations, Symbols for equipment in sub-stations, Apparatus in a transformer sub-station,, Bus-Bar arrangements in sub-stations.	5
Total Hours		52

Textbook :

- 1 Modern Power System Analysis, D P Kothari, Tata McGraw-Hill, 2011
- 2 Principles of Power System, V.K.Mehta and Rohit Mehta, S. Chand, 2014
- 3 Electrical Power systems, C. L .Wadhwa, 5th Edition, New Age International Publishers, 2009

References:

- 1 Power System Analysis, Power System Analysis, John Grainger, William Stevenson, Jr., McGraw-Hill Education, 1994
- 2 Electrical Power Systems, Electrical Power Systems, Ashfaq Husain, 5th Edition, CBS Publishers and Distributors PVT Ltd, 2014

References:

- 3 “Electrical Power Transmission and Distribution, “Electrical Power Transmission and Distribution, Sivanagaraju and Satyanarayana,, Pearson Education, 2008
- 4 “Electric Power Generation Transmission and Distribution, “Electric Power Generation Transmission and Distribution, S. N. Singh, Prentice-Hall of India Pvt. Ltd, 2004

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	25.00	35.00	10.00	10.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, Quiz, brainstorming, case studies etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room.
- 3 Students will use supplementary resources such as online videos

Supplementary Resources:

- 1 https://onlinecourses.nptel.ac.in/noc21_ee15/preview
- 2 <https://www.coursera.org/learn/electric-power-systems>
- 3 <https://www.udemy.com/share/1028lK3@MaBb7moEAdFvvvUsYx8BbwgNvrm6q4QOpG6SdB75K1rDW1lj6TZUymS62sZ9MjK0hw==/>