Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-3

Subject: Electrical Power System - BETEE13305

Type of course: Major

Prerequisite: Basic of Electrical Engineering

Rationale:

The course is aimed to provide exposure about the modeling of power systems components and transmission line, its analysis and performance including the parameters of power systems, brief introduction to corona and transients in power system.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs	% Weightage
1	**Fundamental of electrical energy & Generating stations** Importance of Electrical Energy, Generation of Electrical Energy, Sources of Energy ((renewable, non-renewable), Structure of Electric Power System. **Generating stations** Introduction to Generating Stations, Steam Power Station (Thermal Station), Hydro-electric Power Station, Diesel Power Station, Nuclear Power Station, Variable Load on Power Station	15	25%

2	**Overhead Transmission Line** Constants of a Transmission Line, Resistance of a Transmission Line, and Inductance of a Transmission line, Capacitance of Transmission Line, Numerical	15	25%
3.	**Performance of Overhead Transmission Lines** Introduction, Equivalent circuit of Short Transmission line, Equivalent circuit of Medium Transmission line, Equivalent circuit of Long Transmission line, Examples.	15	25%
4.	**Design of Transmission Line & Underground cables** Electric Power Transmission Towers. Sag evaluation and their calculations. Corona - Visual & Critical voltages - Corona loss -Effect of corona on line design practical considerations. Underground Cable Classification of cables, Cable conductors, insulating materials, Insulation resistance, electrostatic stress, grading of cables, capacitance calculation, losses and current carrying capacity. Location of faults, methods of lying of underground cables.	15	25%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Power Plant Profile** Students have to Analyze different types of power plants (e.g., coal, nuclear, hydroelectric, wind, solar) and Create a chart of advantages and disadvantages of each type.(No. of student per team - 03)	10
2	**India's Energy Landscape** Students have to collect the data of existing power plant and creating a comprehensive overview of a specific power plant. This includes detailing its type, location, capacity, operational status, technology used, environmental impact, and economic significance & Prepare a Report. (No. of Student per team - 3).	10
3	**Sim City** Students have to create virtual substation layout on Virtual Lab & prepare technical report of Substation.(No. of students per team -03)	10
Total		30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**

Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	30%	30%	10%	10%	0

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.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the fundamental principles of electrical power generation, transmission, and distribution.
CO2	Interpret the various transmission concepts & Maintain voltage regulation and efficiency of transmission system.
CO3	Design, Modeling and Evaluation of various parameters of transmission lines.
CO4	Investigate the concept of corona and its effect.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1.	Study Recent Energy Scenario of Electrical Energy.	1	2
2.	Study of different types of Power plants & Its capacity.	1	2
3.	Study and Design thermal power plant in virtual lab..	1	2
4.	Study and Design Nuclear power plant in virtual lab..	1	2
5.	Write a program for calculating line capacitance for different configurations and design of line	2	2
6.	Write a program for calculating line Inductance for different configurations and design of line	2	2
7.	Write a program for calculating line Resistance for different configurations and design of line	2	2
8.	MATLAB Simulation of Transmission Line for Short Transmission Line for calculation of various parameters.	3	2
9.	To calculate the losses and efficiency of a long transmission line	3	2
10.	To calculate the losses and efficiency of a medium transmission line	3	2
11.	Write a program for calculating sag of transmission line under different loading conditions	4	2
12.	To study and collect different types of cables.	4	2
13.	Measurement of Inductance, Capacitance of multi-core cables.	4	2

14.	Measurement Resistance and Insulation Resistance of multi-core cables	4	2
15.	To study Ferranti effect and voltage distribution in H.V. long transmission line using transmission line model.	4	2
	TOTAL		30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] Modern Power System Analysis – D. P. Kothari, I. J. Nagrath, TMH Publication
[2] Power System Analysis – J. J. Grainger, W.D. Stevenson, Mc-GrawHill series publication
[3] http://nptel.ac.in/courses/108101040/
[4] Operation of Restructured Power Systems – K. Bhattacharya, H. J. Bollen, J. E. Daalder, Kluwer academic publishers
[5] Power System Analysis – Hadi Saadat, Mc-GrawHill series publication
[6] Electrical Power systems: C. L. Wadhwa, 5th Edition, New Age InternationalPublishers.
[7] Computer Aided Power System Analysis, G.L. Kusic, © 1986