Sustainle Power System Planning

a. Course Code: EPE-820
b. Title: Sustainable Power System Planning
c. Credit Hours: 3

d. Objectives:

- To provide students with a comprehensive understanding of power system planning, including load forecasting, generation, transmission and distribution expansion planning, and economic and regulatory considerations.
- To develop students' ability to analyze and evaluate power system planning alternatives, including the integration of renewable energy sources into the power system.
- To provide students with an understanding of the economic and regulatory environment that affects power system planning.
- To create an awareness of the impact of power system planning on sustainability and the environment.
- To review economic concepts and reliability analysis in power system expansion planning and operation.

e. Outcomes

- Students will be able to develop power system planning processes, analyze different electric utility structures, interpret regulated and deregulated power markets.
- Learn demand forecasting techniques and their application in developing demand forecasts, apply economic concepts in developing power system infrastructure and conduct reliability analysis.
- Perform generation and transmission expansion planning analysis to arrive at a preferred investment plan in view of the environmental constraints and social aspects.
- Identify challenges and tools for solving large scale power system planning problems

f. Contents with suggested contact hours

No.	Topics	Book	Contact Hours

1.	**Introduction** • Structure and Elements of a Power System • Basics of Power System Planning • Stages and Classification of Power System Planing • Methods of Power System Planning • Importance of Power System Planning	HS, MD, DS	3
2. .	**Load Forecasting** • Load Characteristics and driving parameters • Methods for load forecasting • Accuracy of load forecasting • Importance of load forecasting in power system planning	HS, MD, DS	6
3.	**Economic and Regulatory Considerations** • Basic Concepts of Engineering Economics • Cash Flow Concept • Economic analysis of power system planning • Regulatory environment and its impact on power system planning	TW, HS, MD,	6
4. .	**Power System Reliability Evaluation** • Power System Reliability Indicators • Purpose of Reliability Evaluation • Generation, Transmission and Distribution Reliability • Methods of Reliability Measurement	GA, CS, HS	6
5. .	**Generation Expansion Planning** • Introduction to Generation Expansion Planning • Factors affecting generation expansion planning • Methods for evaluating generation expansion alternatives • Role of renewable energy sources in generation expansion planning	HS, MD, DS	6
6.	**Transmission and Distribution Expansion Planning** • Transmission system planning • Distribution system planning • Integration of transmission and distribution planning • Transmission and distribution expansion planning criteria and approach	HS, MD, DS	6

7.	**Power System Planning in the Presence of Uncertainties** • Power System Deregultion • Power System Uncertainties • Practical Issues of Power System Planning • Dealing with Uncertainties in Power System Planning	HS, MD, DS	6
8.	**Case Studies** • Examples of power system planning in different countries/regions • Comparison of different power system planning approaches	HS, MD, DS	6
Total			**45**

g. Details of lab work, and workshop practice (if applicable). N/A

h. Recommended Reading (including Textbooks and Reference books with dates).

S. No.	Title	Author(s)	Year Published	Codes	Remarks
1.	Electric Power System Planning Issues, Algorithms and Solutions	Hossein Seifi Mohammad Sadegh Sepasian	2011	HS	Text Book
2.	Electric Power Grid Reliability Evaluation: Models and Methods	Chanan Singh, Panida Jirutitijaroen, Joydeep Mitra	2018	CS	Reference Book
3.	Uncertainties in Modern Power Systems	Ahmed F. Zobaa and Shady H.E. Abdel Aleem	2020	AF	Reference Book
4.	Modern Power System Planning	McDonald, J.R	2007	MD	Text Book
5.	Electric Power Planning in Regulated and Deregulated Markets	Arthur Mazer	2007	AM	Reference Book
6.	Electric Power System Planning	Dasari, S	1999	DS	Referrence Book

i. Assessments

Mid-term, Final Exam and quizzes, assignment etc.