POWER SYSTEM PLANNING AND RELIABILITY

PEC-IV: EPS

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BPSB18	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. COURSE OVERVIEW:

The Power system reliability course will provide students with a fundamental knowledge on the reliability evaluation of engineering systems with emphasis on electric power systems. Models and methodologies for power systems reliability assessment will be studied. Application of probability theory for design and management of power generation, transmission and distribution systems using SCADA.

II. COURSE OBJECTIVES:

The course should enable the students to:

I. Describethegenerationsystemmodelandrecursiverelationforcapacitivemodelbuilding.
II. Explain the equivalent transitional rates, cumulative probability and cumulative frequency.
III. Develop the understanding of risk, system and load point reliability indices.
IV. Understand the basic and performance reliability indices.

III. COURSE OUTCOMES:

After successful completion of the course, students will be able to:		
CO 1	**Apply**concepts of the probability theory for power systems reliability evaluation	Apply
CO 2	**Apply** probability methods to formulate and probabilistically simulate simple electric energy systemsfor computing reliability indices and production costs	Apply
CO 3	**Evaluate** generation capacities bypooling all sources of generation with all loads	Analyze
CO 4	**Analyze**distribution system networks with indicesto improve power system performance	Analyze
CO 5	**Illustrate** optimal solutionsfor improvising power transfer capability, enhancing power quality and reliability	Apply
CO 6	**Justify** the basic tasks of Supervisory Control Systems (SCADA)as well as their typical applications in industries	Evaluate

IV. SYLLABUS

UNIT-I	LOAD FORECASTING	Classes: 09

Objectives of forecasting: Load growth patterns and their importance in planning, load forecasting Based on discounted multiple regression technique, weather sensitive load forecasting, determination of annual forecasting, use of AI in load forecasting.

UNIT-II	GENERATION SYSTEM RELIABILITY ANALYSIS	Classes: 09

Probabilistic generation and load models: Determination of LOLP and expected value of demand not served, determination of reliability of ISO and interconnected generation systems.

UNIT-III	TRANSMISSION SYSTEMS RELIABILITY EVALUATION	Classes: 09

Deterministic contingency analysis: Probabilistic load flow, fuzzy load flow probabilistic transmission system reliability analysis.

Determination of reliability indices like LOLP and expected value of demand not served.

UNIT-IV	EXPANSION PLANNING	Classes: 09

Basic concepts on expansion planning-procedure followed for integrate transmission system planning, current practice in India, capacitor placer problem in transmission system and radial distributions system.

UNIT-V	DISTRIBUTION SYSTEM PLANNING OVERVIEW	Classes: 09

Introduction, sub transmission lines and distribution substations, design primary and secondary systems, distribution system protection and coordination of protective devices.

Text Books:

1. Roy Billinton and Ronald Allan Pitam: Reliability Evaluation of Power Systems, 1st Edition,1996.
2. RL Sullivan: Power System Planning, McGraw Hill International, 1st Edition,1977.

Reference Books:

1. Wheel Wright and Makridak is: Forecasting methods and Applications, John Wiley, 1st Edition,1992.
2. J Endremyl: Reliability Modelling in Electric Power Systems, John Wiley, 1st Edition,2005.
3. X. Wang & J.R. McDonald, “Modern Power System Planning”, McGraw Hill Book Company,1994.
4. T. Gonen, “Electrical Power Distribution Engineering”, McGraw Hill Book Company,1986

Web References:

1. https://www.researchgate.net
2. https://www.aar.faculty.asu.edu/classes
3. https://www.facstaff.bucknell.edu/
4. https://www.electrical4u.com
5. https://www.iare.ac.in

E-Text Books:

1. https://www.jntubook.com/
2. https://www.freeengineeringbooks.com