ECONOMIC OPERATION OF POWER SYSTEMS

I Semester: EPS

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BPSB02	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I.COURSEOVERVIEW:

This course will illustrate the difference between economic load dispatch and unit commitment problem and provide the mathematical platform to solve economic load scheduling (with and without network losses) and unit commitment problem, solve hydro-thermal scheduling problem This subject will also cover the analyze of single area and two area systems for frequency deviation and help students to solve the OPF problem using ac and dc load flow methods.

II.COURSE OBJECTIVES:

This course should enable the students to:

I. Formulate and derive the necessary conditions for economical loadscheduling problem.
II. Understand various constraints, problem formulation and methods to solve the UNITcommitment problem.
III. Explain the constraints related to hydel power plants, problem formulation and solution techniques for hydro-thermalscheduling problem.
IV. Describethenecessity,factorsgoverningthefrequencycontrolandanalyzetheuncontrolledandcontrolled LFC system.
V. ExplainthebasicdifferencebetweenELSandOPFproblem,formulationoftheOPFproblemandsolution techniques.

III.COURSEOUTCOMES:

After successful completion of the course, students will be able to:		
CO 1	**Solve**the unit Commitment problem with various constraints**using conventional optimization techniques and general transmission line loss formula**	Apply
CO 2	**Identify**an optimal operation setup of power system**for minimizes operation costs and meet desired needs**	Apply
CO 3	**Categorize**single area load frequency control and two area load frequency control**to minimize the transient deviations and steady state error to zero**	Analyze
CO 4	**Analyse**the importance of Reactive power control and Power Factor in power systems**for efficient and reliable operation of power systems.**	Apply
CO 5	**Develop**the appropriate control scheme**for compensating reactive power**	Apply
CO 6	**Identify**the different types of compensating equipment**for reducing reactive power to improve system's efficiency**	Apply

IV. SYLLABUS

UNIT-I	ECONOMIC LOAD SCHEDULING	Classes: 09

Characteristics of steam turbine, variations in steam UNIT characteristics, economic dispatch with piecewise linear cost functions, Lambda iterative method, LP method, economic dispatch under composite generation production cost function, base point and participation factors, thermal system dispatching with network losses considered.

UNIT-II	UNIT COMMITMENT	Classes:10

UNIT Commitment, definition, constraints in UNIT commitment, UNIT commitment solution methods, priority, list methods, dynamic programming solution.

UNIT-III	HYDRO THERMAL SCHEDULING	Classes:08

Characteristics of Hydroelectric UNITs, introduction to hydrothermal coordination, long range and short range hydro scheduling.

Hydroelectric plant models, hydrothermal scheduling with storage limitations, dynamic programming solution to hydrothermal scheduling.

UNIT-IV	LOAD FREQUENCY CONTROL	Classes:09

Control of generation, models of power system elements, single area and two area block diagrams, generation control with PID controllers, implementation of Automatic Generation control (AGC), AGCfeatures.

UNIT-V	OPTIMAL POWER FLOW	Classes:09

Introduction to Optimal power flow problem, OPF calculations combining economic dispatch and power flow, OPF using DC power flow, algorithms for solution of the ACOPF, optimal reactive power dispatch.

Text Books:

1. J J Grainger & W DStevenson, “Power system analysis”, McGraw Hill,2nd Edition,2003.
2. Allen JWood, Bruce F Wollenberg, Gerald B Sheblé, “Power Generation, Operation and Control”, WileyInterscience2ndEdition,2013.

Reference Books:

1. Olle, Elgerd, “Electric Energy Systems Theory an Introduction”, TMH, 2nd Edition, 1983.

Web References:

1. https://pdfs.semanticscholar.org/b99b/cedc7f9e06d8b21d910767bb886a6d038283.pdf
2. https://core.ac.uk/download/pdf/33363832.pdf

E-Text Books:

1. https://core.ac.uk/download/pdf/33363832.pdf
2. http://vbn.aau.dk/files/226382872/seyedmostafa_farashbashiastaneh.pdf