BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
SECOND SEMESTER 2018-2019
Course Handout

06 /01/2020

Course No : EEE F312
Course Title : Power Systems
Instructor-in-charge : Dr. Alivelu Manga Parimi

1. Learning Outcomes:
   a) The student will be able to model the power system network and understand its performance characteristics.
   b) The student would be able to perform the stability and fault analysis of the power system network.
   c) The student would be able to understand the basic control of the frequency and voltage in the network.
   d) The student will be able to comprehend the concepts of protection of the power system network.

2. Scope and objective:
   This course aims at introducing the students to the basic features of the modern power systems, analysis and operation under steady state and transient conditions.
3. Course description:
   Review and importance of power system, Present power system scenario, Transmission line parameters and modeling, Characteristics and performance of lines, Load flow studies, Optimal system operation, Automatic Generation and voltage Control, Power system fault analysis, Power Systems stability, Introduction of power system protection.

4. Text Book:
   1. Nagrath I.J. and D.P.Kothari, "Power System Engineering" TMH, 1994.

5. Reference books:

   Glover J Duncan and Sarma Mulukutala S, "Power System Analysis and Design" 3rd edition, Thomson Brooks/Cole, 2003.

6. Course Plan:

Lecture No.	Learning objective	Topic to be covered	Chapter in the Text Book
1.	A perspective of Power system: Review importance and computer applications in	Introduction	1.1 of T; 1.1. to 1.5 of R

	power system		
2.	Transmission line modeling	Inductance calculations for single and three phase configurations	2.1 to 2.8
3.	Transmission line modeling	Inductance calculations for double circuit bundle conductors resistance, skin & proximity effect	2.9 to 2.12
4.	Transmission line modeling	Simple capacitance calculations	3.1 to 3.6
5.	Transmission line modeling	Effect of earth, methods o GMD (Modified) bundle conductors.	3.7 to 3.9
6.	P.U System	One line diagram and per unit system	4.3 to 4.4
7 – 8	Characteristics and performance of lines	Analysis of short and medium lines	5.1 to 5.3
9 – 10	Characteristics and performance of lines	Long transmission lines, Equivalent circuit of long lines,	5.4 to 5.5
11 – 12	Characteristics and performance of lines	Ferranti effect, tuned power lines.	5.7 to 5.8
13	Load flow studies	Introduction and importance	6.1 to 6.2
14	Load flow studies	Y Bus formulation, load flow problem	6.3 to 6.4
15 – 16	Load flow studies	Gauss – Siedel & Newton Raphson Method	6.5 to 6.6
17-18	Optimal system operation	Optimal operation, Unit commitment	7.1 to 7.3
19.	Automatic Generation and Voltage Control	Load frequency control	8.1 to 8.2
20	Symmetrical Fault Analysis	Transient Short Circuits	9.1 to 9.3
21	Symmetrical Fault Analysis	Short circuit and load selection of circuit breakers	9.4 to 9.5
22	Symmetrical Components	Transformation, phase shift	10.1 to 10.3
23	Symmetrical Components	Sequence impedances of line generation and transformers	10.4 to 10.8
24	Symmetrical components	Construction of sequence networks	10.9
25 – 26	Unsymmetrical fault analysis	Line to ground, line to line, and double line to ground faults, open conductor fault	11.1 to 11.6
27	Power Systems stability	Dynamic of a synchronous ,machine	12.1 to 12.2

28-29	Power system stability	Steady-state stability of simple systems	12.3 to 12.6
30-31	Power system stability	Equal area criterion	12.7 to 12.8
32	Power system transient	Types of transients, traveling waves.	13.1 to 13.3
33-34	Power system transient	Generation of over voltages protection of lines against lightning Protection against surges and insulation coordination	13.4 to 13.5 13.6 to 13.7
35-36	Circuit Breakers	Transients, rating and arc extinction	14.1 to 14.3
37	Power system protection	Protective zones	15.1 to 15.2
38-40	Power system protection	Relaying elements and quantities, current and voltage transformers, Relay types and characteristics	15.3 to 15.5
41	Advanced topics in Power Systems	Advanced topics in Power Systems	Class notes

Evaluation Scheme:

No	Components	Duration	Marks	Date/Time	Nature of Components
1	Mid-term	90 Min	30%	4/3 9.00 - 10.30AM	CB
3	Surprise/ Announced Quiz	Tutorial/ lecture hour	30%		CB
4	Comprehensive. Exam	3 Hours	20% 20%	06/05 AN	OB CB

Chamber consultation Hours: To be announced in the class.

Course Notices: Notices will be displayed in CMS

Make-up Examination: No makeup for quizzes. Make-up for the tests will be granted only on extremely genuine grounds only. Prior application and approval should be making for seeking this.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-In-Charge
EEE F312.