Name of Institute: Institute of Technology & Engineering

Name of Faculty:Vineeta S. Chauhan

Course code: EL0516

Course name: Power System-II

Pre-requisites: Power System –I, Fundamentals of Power System

Credit points: 04

Offered Semester: V

Course Coordinator

Full Name: Vineeta S. Chauhan

Department with sitting location: Electrical Engineering Department,

2nd floor , EEE LAB-1, Bhanwar Building.

Telephone: 9638251076

Email: vineetachauhan.el@ indusuni.ac.in

Consultation times: 4:15 – 4:50 p.m.

Course Lecturer

Full Name: Vineeta S. Chauhan

Department with sitting location: Electrical Engineering Department,

2nd floor , EEE LAB-1, Bhanwar Building.

Telephone: 9638251076

Email: vineetachauhan.el@ indusuni.ac.in

Consultation times: 4:15 – 4:50 p.m.

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

1) To prepare mathematical model of the transmission system.
2) To analyze symmetrical components and their mathematical model
3) To study short circuit symmetrical and unsymmetrical condition.
4) To study Asymmetrical Fault Analysis using different mathematical methods
5) To analyze transients in power system.

Course Outcomes (CO)

CO1: Create computational models for analysis of power systems and able to understand per unit system. [BT-6]
CO 2: Solve load flow computations and analyze the load flow results. [BT-3]
CO3: Analyze power system network under Symmetrical and Unsymmetrical conditions. [BT-4]
CO4: Determine positive Sequence, Negative Sequence and Zero Sequence and fault analysis.[BT-3]
CO5: Explain the concept of Power System Transients and protection against It. [BT-2]
CO6: Determine the electrical parameters and characteristics of transmission lines. [BT-3]

Course Outline

This course mainly deals with different types faults in power system. This subjects deals with detailed analysis of the faults and their mathematical model analysis. The power system transients are also covered.

Method of delivery

Face to face lectures

Study time

3 Hour Lecture and 2 Hour Practical Laboratory per week

CO-PO Mapping (PO: Program Outcomes)

Mapping CO's with PO's

	PO1	PO2	PO3	PO 4	PO 5	PO6	PO7	PO8	PO 9	PO10	PO11	PO1 2
CO1	3	-	3	1	-	-	-	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	-
CO3	3	2	3	2	-	-	-	-	-	-	-	-
CO4	3	2	3	3	-	-	-	-	-	-	-	-
CO5	3	2	3	2	-	-	-	-	-	-	-	-
CO6	3	2	3	2	-	-	-	-	-	-	-	-

1-Lightly Mapped 2- Moderately Mapped 3- Highly Mapped

Blooms Taxonomyand Knowledge retention(For reference)

(Blooms taxonomy has been given for reference)

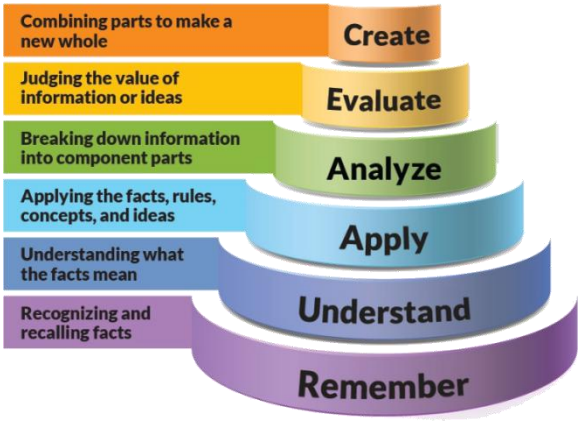


Figure 1: Blooms Taxonomy

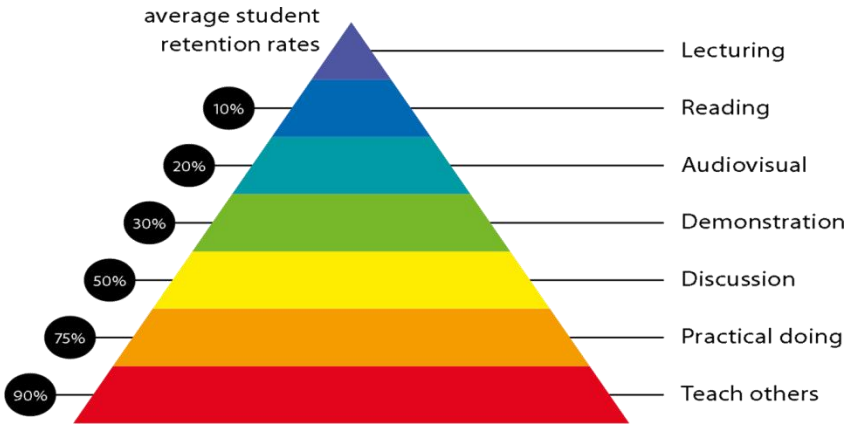


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**

Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

(Mention what practical work this Course involves)

Lecture/tutorial times

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books

1.G.W. Stagg ; A. H. EI-Abaid, “Computer methods in Power System Analysis”, McGraw Hill, New York.

2. W. D. Stevenson , “Element of Power System Analysis”, Mc Graw Hill, 1982.

3. Nagrath & kothari, “ Power System Engineering”, TMH publishing Company Ltd.

Reference Books

1.C.L.Wadhwa, “Electric Power System”, New Age International Ltd.

2. C. S. Indulkar and D P Kothari, “Power System Transients, A Statistical Approach”, Prentice Hall of India Pvt Ltd., New Delhi.

3. N. G. Hingorani, J Gyugi, “Understanding FACTS”, IEEE Press.

4. K. Bhattacharya, MHT Bollern and J. C. Doolder, “Operation of Restructured Power Systems”, Kluwer Academic Publishers, USA, 2001.

Additional Materials

1. nptel.ac.in/downloads/108101040/

2. https://www.smartzworld.com/notes/power-system-ii-ps-ii/

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Theory

CIE 60 marks (40 marks mid semester examination + 20 marks internal evaluation)

Components of internal evaluation
05 marks as attendance bonus for all students having attendance > 80%
05 marks for presentation
10 marks for assignment or case studies

Laboratory

File Work (10 marks)
Lab Participation (20 marks)
Project / Presentation (20 marks)
Viva – Voice (10 marks)

End Term Examination: 40 marks

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

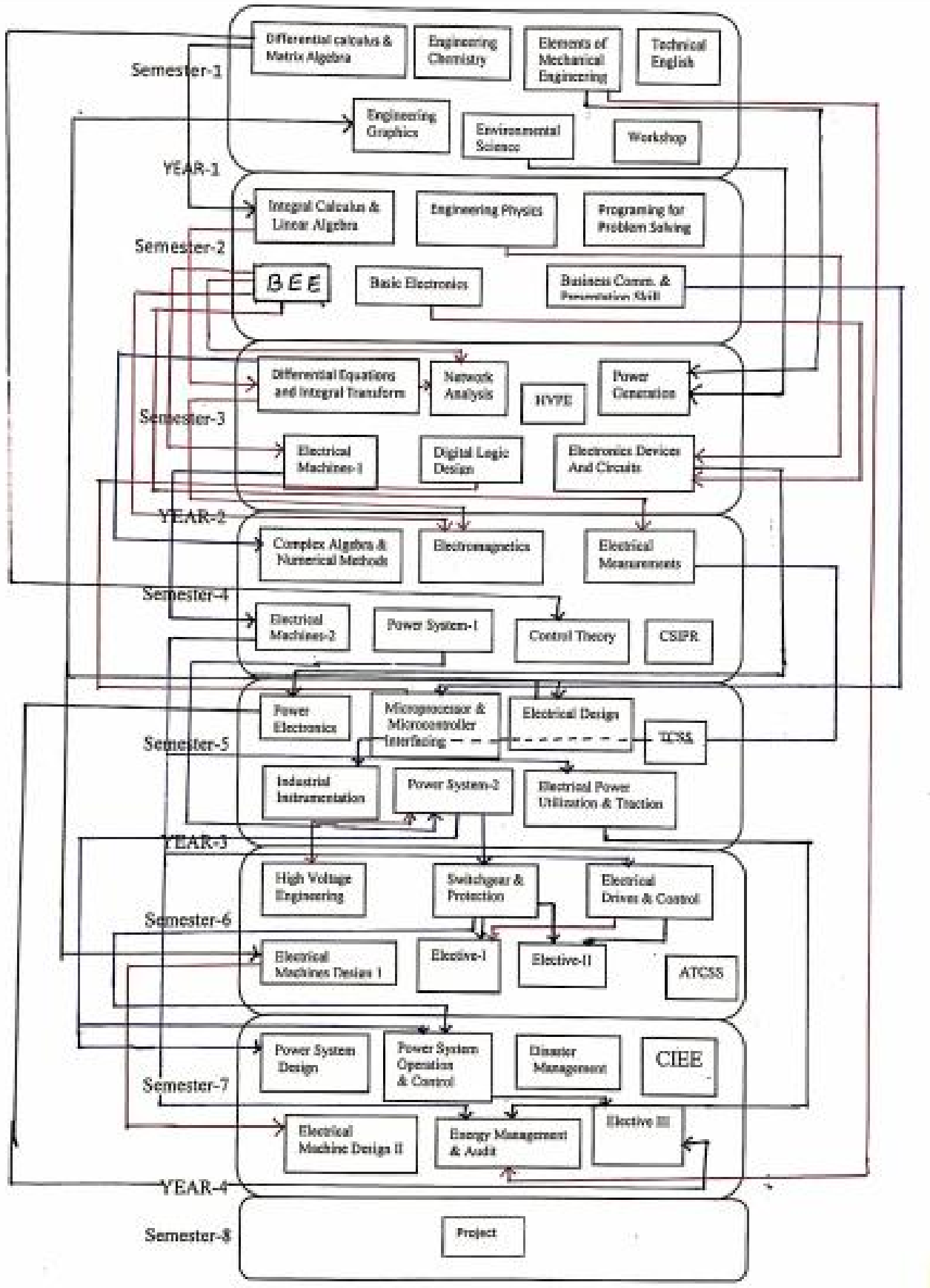
.Course schedule(subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Representation of Power System Components Introduction, single phase solution of balanced three phase networks, the one line diagram and the impedance or reactance diagram,	CO1	Chalk & Talk
	Weeks 2	Per-unit (pu) system, complex power, synchronous machine, representation of loads. Characteristics and performance of power transmission lines	CO1	Chalk & Talk
	Week 3	Short and medium transmission lines, Line performance, effect of capacitance, charging currents, short and medium lines, calculation by nominal-T, nominal-π and end- condenser method, regulation and efficiency, Concept of ABCD constants, the long transmission line-rigorous solution	*CO1, CO2*	Chalk & Talk
	Week 4	Evaluation of ABCD constants, interpretation of long line equation, surge impedance and surge impedance loading, the equivalent circuit of a long transmission line, power flow through a transmission line, circle diagrams, Ferranti effect.	*CO1, CO2*	Chalk & Talk
	Week 5	Review of Symmetrical Components and Its Application to Power System Symmetrical component transformation, phase shift in star-delta transformers, sequence impedance of transmission	*CO1, CO2, CO3*	Chalk & Talk

		lines, sequence impedance and sequence network of power system,		
	Week 6	Sequence impedance and network of synchronous machine, sequence impedance of transmission lines, sequence impedance and networks of transformers, construction of sequence networks of power systems	*CO5*	Chalk & Talk
	Week 7	Symmetrical Fault Analysis- Introduction, transient on a transmission line, short circuit of a synchronous machine on no load, short circuit of a loaded synchronous machine, balanced three phase fault, short circuit capacity	CO5	Chalk & Talk
	Week 8	Fault analysis using bus impedance matrix, selection of protective equipments	CO5	Chalk & Talk
	Week 9	Unsymmetrical Fault Analysis - Symmetrical component analysis of unsymmetrical faults, single line to ground (LG) fault, line-to line (LL) fault,	*C02*	Chalk & Talk
	Week 10	Double line to ground (LLG) fault, open conductor faults	*C02*	Chalk & Talk
	Week 11	Bus impedance matrix method for analysis of unsymmetrical faults	CO4	Chalk & Talk
	Week 12	Power System Transients -Types of system transients, factors affecting transients	CO4	Chalk & Talk
	Week 13	Reflection and refraction of traveling Waves at different line termination, surge impedance, transient over voltages due to lightning	CO4	Chalk & Talk
	Week 14	Theory of ground wires, direct stroke to a tower, capacitive switching, kilometric fault,	CO4, CO6	Chalk & Talk

	Week 15	Ferro-resonance, protection of power systems against transients and insulation coordination	CO4,CO6	Chalk & Talk



Elective-I: Advanced Control Theory, Industrial Automation, Soft Computing
Elective-II: Electrical Power Quality, EHV AC & DC, Special Machines, MOOC
Elective-III: FACTS, Advanced Power Electronics, Power System Planning, MOOC