



Course: High Voltage Engineering – 0923781 (3 Cr. – Elective Course for thesis track)

Catalog Data: Introduction to high voltage engineering. Conduction and breakdown in gases, liquids and solids. Applications of insulating materials. Generation of high voltages and high currents. Measurement of high voltages and current. Insulation coordination, surge arresters, HV overhead line insulators. Calculation of voltage distribution along insulators. High voltage bushings (types, design and applications). HV cables. Corona discharge. Circuit breakers.

Prerequisites by Course: **None**

Textbook: **None**

References:

1. M.S. Naidu and V. Kamaraju, *High Voltage Engineering*. 2nd ed., McGraw-Hill, Education Group, 1999.
2. E. Kuffel, W.S. Zaengl, *High Voltage Engineering Fundamentals*. Pergamon Press, Reprinted 1st Ed. 1984, Oxford/England, 1986.
3. C. L. Wadhwa, *High Voltage Engineering*, New Age International Publisher, 2nd Ed. 2007.
4. M. Abdel-Salam, H. Anis, A. El-Morshedy and R. Radwan: *High-Voltage Engineering: Theory and Practice*. 2nd ed., Marcel Dekker Inc., New York, USA, 2000.

Schedule &

Duration: 16 Weeks, 48 lectures, 50 minutes each (including exams).

Course Objectives:

To provide students with a thorough understanding of the physical basis and concepts of high-voltage engineering and the associated phenomena.

Course Learning Outcomes and Relation to Program Learning Outcomes:

Upon completion of the High Voltage Engineering course, the student will be able to:

1. learn the origin and mitigation of overvoltages and insulation coordination in electric power systems [i, ii].
2. understand the voltage and current wave propagation on lines and cables and the applications of surge arresters [i].
3. learn the basic knowledge of the phenomena associated with the electrical conduction and breakdown in various states of matter[i].
4. understand what is meant by the corona phenomenon on OHTL and the factors affecting it [i].
5. learn the generation and measurements of different types of high voltages and high currents [i].
6. understand the performance of high-voltage line insulators and bushings design [i,ii,iii].
7. learn the types and applications power circuit breakers and switchgear [i,ii,iii,iv]

Course Topics:

Topic	Description	Contact Hours
T.1.	Generation & Measurement of High Voltages and Currents	6
T.2.	Overvoltages & Insulation Coordination in Electric Power Systems	9
T.3.	Conduction and Breakdown in Gases, Liquids, Solid insulating materials	9
T.4.	Overhead Line Insulators	6
T.5.	HV Bushings	6
T.6.	HV Cables	6
T.7.	Gas-insulated switchgear and Circuit Breakers	2
T.8.	Corona Discharge	2

Computer Usage: students are encouraged to write/use computer programs for mathematical modelling.

Attendance: Class attendance will be taken and the University policy on absence will be followed.

Assessments: Exams

Grading policy:

Semester work	60 %
Final Exam	40 %
Total	100%

Instructor:

Instructor Name	Office	Ext.	E-mail
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Program learning outcomes

i	Demonstrate a sound, in-depth and up-to-date technical knowledge in the field of specialization.
ii	Ability to identify and solve engineering problems in their chosen field of study.
iii	Acquire the skills for continued professional development and independent self-study.
iv	Demonstrate the ability to communicate technical information effectively and professionally both orally and in writing..

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