King Fahd University Petroleum & Minerals
Electrical Engineering Department

Tentative Course Handout for EE 464 High Voltage Engineering 091

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Textbook:

Notes and Handouts by instructor

High Voltage Engineering and Measurements by Zignan

Reference Book:

High Voltage Engineering by J R Lucas, First Produced in Cyclostyled form 1970

There are also many other books available in the Library which cover this course materials.

Prerequisites:

EE 360 and Instructor Consent

Course objectives

To cover as introductory course to High Voltage Engineering

Topics Covered:

- Ionization processes in gas discharges
- Relevant gas ionization processes
- Breakdown Characteristic in gases
- Electron Avalanche Mechanism (Townsend Breakdown Process)
- Paschen's Law
- Streamer Mechanism
- Factors affecting the breakdown voltage a Vacuum gap
- Corona Discharges
- Breakdown in Liquids
- Breakdown of Commercial liquids.
- Breakdown due to gaseous inclusions.
- Breakdown due to liquid globules
- Breakdown due to solid particles
- Purification of a liquid for testing..

- Breakdown of Solid Insulating Materials.
- Electro-mechanical breakdown.
- Breakdown due to internal discharge
- High Voltage Cables
- Power loss in the Cable.
- Properties required of cable insulation
- Insulation Resistance.
- Capacitance in a single-core cable.
- Three-core Cables
- High Voltage Measurement...
- Direct Measurement of High Voltages
- Electrostatic Voltmeters
- Sphere gaps
- Transformer and potential divider methods of measurement
- Measurement of Surges
- General measurements

Class/Laboratory Schedule:

2 lectures per week, 1:15 minutes each and 3 hours lab per week.

There will be about 5-7 experiments-

The lab is located at Building 15 Research institute basement; we would like to coordinate with Mr. Khalid Al Soufi for the lab experiment schedule.

Grading:

Homework class performance, course folder, and attendance: 15%
Exam: 20 %
Term Project: 35%
Final Exam: 30%

Tentative Exam Dates:

Exam November 7, 2009, Or as will be Announce by Instructor

the instructor will not tighten these requirements; however, he reserves the right to relax them.

Personal Information: Given Verbally, Guidelines:

Makeup exams and late homework will only be permitted for officially excused absence
- Students are expected to attend, participate in all course activities, and to give oral presentation of their project and submit a full project term paper on due date.

- Students are required to attend all BI-weekly briefing meetings for term project progress -It is expected from each student to be able to learn independent studying habits, self reliance, and to be creative, analytical, able to develop and comprehends course materials with little help and assistant.

Term Projects:

Each student may work in each of the attached subjects list, each student should have a brief proposal within 2-weeks and must be approved by instructor, final project report, and each student should be able to present his work at the final presentation. Details of the project will be submitted in the first BI-Weekly meeting with course instructor, meetings should be arranged with instructor by the student.

Another alternative of Term project: any student have his own idea on a related topic can submit a term project preliminary proposal in the Third week, proposals should give a brief description of the project. Instructor will give suggestion, changing, refusals, of the topic, or go ahead within fourth week, proposals should contain statement of objectives, and methodology, and references, etc ... Should be briefly mentioned NOT MORE THAN (5) five PAGES (typed) PLEASE.

Each term project report consist of

- Abstract
- Introduction
- Literature review or theory
- Statement of the problem or objectives
- Data Schematics, and diagrams
- Program, method of analysis
- Calculations and results
- Conclusions
- References used

Term project typed report will be due in: Jan 5, 2010

NOTE: Syllabus material may also be presented out of the text. The instructor reserves the right to relax or cut some of the topics.

***A* folder with notes, graded homework, exams, lab reports and *extra* work, neatly organized must be submitted to the instructor on due date of the term project.**

Topics for EE 464 Term Projects, Term 091
By: Prof. M- H. Shwehdi

1- Design of an impulse generator of 800 KV , 1.0Kj
2- Design of a cascade AC transformer to 1200 KV output
3- Design of a IEEE Standard 24.4 Cm Sphere Gap to be used as a calibration device
4- Research papers on how can Renewable Energy Resources (Solar or Energy) be used in HV grid
5- Uses of HV application in energy Savings