FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

Faculty of Engineering & Technology

Applications in Protection & Switchgear System

Information :

Course Code :	EPR 582	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours
Department :	Specialization of Electrical Power Engineering				

Area Of Study :

This course aims to:

1. Demonstrate knowledge and understanding of over voltages and traveling waves in electrical power systems with the associated suitable protection devices and schemes.
2. Increase the student's essential understanding for performing system insulation design with adequate reliability at a minimum cost.
3. Demonstrate knowledge and understanding of power system protection fundamentals, protection of different power system components, and protective devices coordination.
4. The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through application and analysis of realistic power system data

The above objectives will be achieved through a series of lectures and tutorial classes.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Understanding of high voltage engineering and insulation characteristics.
2 -	Understanding of power system phenomena in steady state, and transients.
3 -	Understanding power system protection equipment.
4 -	Familiar with the concept of design of protection schemes.
b.Intellectual Skills: :	
1 -	Ability to define the engineering problems.
2 -	Ability to drive different solution alternatives for the engineering problems.
3 -	Ability to analyze the solution alternatives and choose the optimum one.
4 -	Ability to identify acceptable solutions of problems based on physical and operational limits of power system components.
5 -	Ability to correlate between a solution based on a given system state to the system behavior at different states.
c.Professional and Practical Skills: :	
1 -	bility to select suitable protection schemes for different components in electric power systems such as: electric machines, transmission and distribution system, power electronic circuits, control systems, measuring instruments, control systems, insulation.

d.General and Transferable Skills: :	
1 -	Present power system.
2 -	Write technical reports and conduct presentation about power system protection problems.
3 -	Practice working in a team.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Over-voltage transients (general); Importance, characteristics, types, its control.	6	4	2
Travelling waves, Surge velocity, Surge impedance, Surge power and energy stored.	8	4	4
Incident reflected and transmitted waves (coefficients), Different termination cases.	9	5	4
Bewley lattice diagram, application to simple cases.	8	5	3
Applications: Over-voltage protection, Surge diverters and Insulation Coordination,	7	5	2
Item Protection: Protection of generators.	8	5	3
Protection of transformers.	9	6	3
Protection of Bus-bars.	5	3	2
Protection of transmission lines, (carrier protection).	8	5	3
Coordination of protective devices.	7	3	4

Teaching And Learning Methodologies :

Lectures
Tutorials

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Attendance	10.00		to assess the performance of students during the course
Final Exam	40.00	15	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied.
First Mid-Term Exam	15.00	7	to assess the skills of problem solving, understanding of related topics.
Quizzes and Assignments (1)	10.00	5	to assess the skills of problem solving, understanding of related topics.
Quizzes and Assignments (2)	10.00	9	to assess the skills of problem solving, understanding of related topics.
Second Mid-Term Exam	15.00	11	to assess the skills of problem solving, understanding of related topics.

Books :

Book	Author	Publisher
Switchgear Protection and Power Systems	S.S. Rao	Khann

Course Notes :

No course notes are required

Recommended books :

SUNIL S. RAO , “Switchgear Protection and Power Systems”, Khanna Publishers, thirteenth edition 2008.
Horwitz, S. H. and Phadke, A. G., “Power System Relaying”, John Wiley, 1992.