ملف المعامل لقسم هندسة القوى و الالات الكهربائية

المحتويات

معامل هندسة القوى و الالات الكهربية

مقدمة:

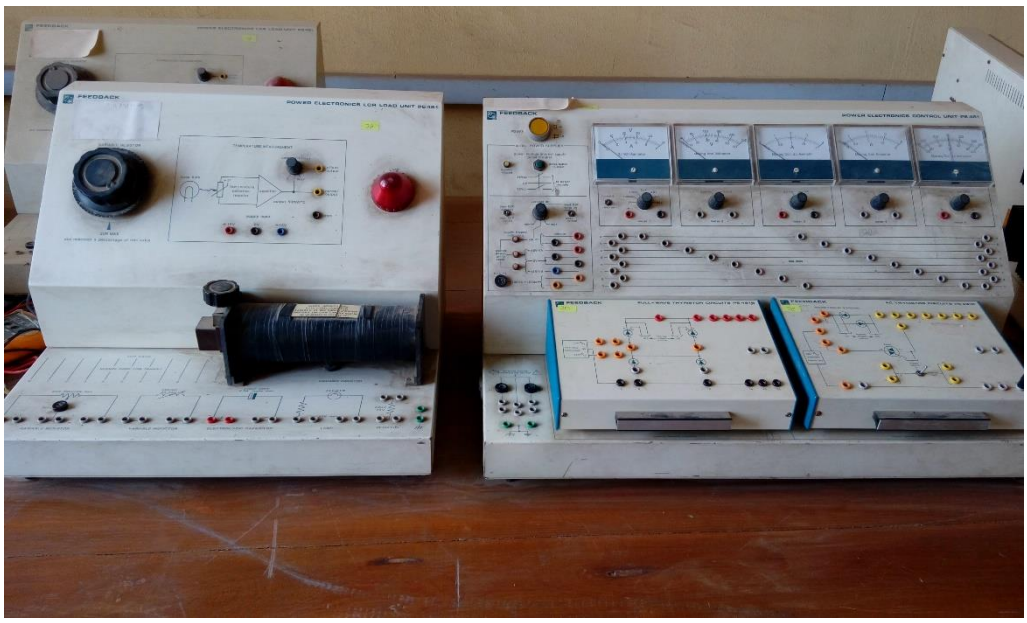
إن عملية الربط ما بين المنهج النظري والتطبيق العملي يرسخ المعلومه في ذهن الدارس ويكسبه المهارات الفنية الأساسية. المعمل أداة ضروريه ومهمة لقسم هنسة القوى والآلات الكهربية حيث يهدف الى توضيح المفاهيم العلمية التى يتم تناولها فى المحاضرات للدارس وترجمها عملياً لترسيخها في أذهانهم ، الأمر الذي يدفعهم الى الفهم المعمق و محاولة الابداع والاستكشاف.

لدى قسم هندسة القوى و الالات الكهربائية عدد ستة معامل تدعم أنشطته التعليمية والبحثية لتغطي الجانب العلمي والتطبيقي للمواد النظرية المعطاة للدارس في مختلف المراحل حتى تكتمل الصورة حول المنهج العلمي المقرر علميا ونظريا لدى الدارس. علما بأن هذة المعامل تدعم طلبة البكالوريوس والدراسات العليا وكذلك أعضاء القسم لإجراء البحوث العلمية ومشاريع التخرج. تضمن المقررات المعملية الموضوعة باللائحة اجراء مجموعة من التجارب لتطوير المهارات العملية للطلاب الدارسين. معامل القسم مجهزة بالمرافق الأساسية مثل المصادر الكهربائية للتيار المستمر المتغير و الثابت ومصادر التيار المتردد ومنظمات الجهد ومولدات الإشارة وراسم الذبذبات oscilloscope ، وأجهزة القياس المتعددة بالمؤشر والرقمي لقياس الكميات الأساسية (الجهد والتيارة والمقاومة) وأيضا عددا من أجهزة الحاسب الشخصية المتضمنة لتشغيل البرمجيات

التعليمية اللازمة لعمل المحكاة و البرمجة موجود بمعمل الحاسب الألى بالدور الخامس، وقائمة المعامل الموجودة بالفعل كالاتى:

معمل الدوائر الكهربائية و أساسيات الكهرباء:

يعتبر هذا المختبر من المختبرات الرئيسية والمهمة بالنسبة لطلبة السنة الأولى كهرباء. يهدف هذا المختبر إلى اكساب المهارات الأساسية في كيفية بناء الدوائر الكهربائية البسيطة و كيفية استخدام أجهزة الفحص والقياس الأساسية، حيث يتعرف الطالب في البداية كيفية التعامل مع أجهزة قياس فرق الجهد والتيار والمقاومة وكيفية استخدامها عمليا والتعرف على تطبيق قانون أوم و أنواع ربط الدوائر الكهربائية (ربط التوالي ، ربط التوازي ، الربط المختلط) والقوانين الأساسية مع كل نوع ، وتجرى تجارب دوائر التيار المتناوب وكيفية التعامل مع جهاز راسم الموجة الاوسيلوسكوب وكيفية قياس التردد وزاوية طور باستخدام هذا الجهاز. وبهذا يكون الطالب قد تعرف على المباديء الأساسية التي يحتاجها مهندس الكهرباء في الحياة العملية . حيث تهدف الى تحقيق قوانين كيرشوف و نظريات التجميع والتبادل و نظرية ثيفنن ونورتون و فهم دوائر التيار المتردد (R,L,C) و دوائر الرنين و دوائر التيار المتغير ثلاثية الأوجه.



معامل الآلات الكهربية (١) و(٢):

يعتبر هذا المختبر من المختبرات المهمة لطلبة الفرقة الثالثة و الرابعة. حيث تجرى تجارب هذا المختبر في الفصل الدراسي الأول و الثاني . يعنى هذه المعامل بتجارب بدراسة أهم خواص مولدات ومحركات التيار المستمر حسب نوع الربط لملفات الإثارة. يشمل منهاج المعامل تجارب تتعامل مع

Series , Shunt and Compound Winding DC Generator and Motor : ويقوم الدارس بقياس التيار وفرق الجهد الخارج والمجهز في كل تجربة وتغيير ملفات المجال حسب النوع وأيضا يقوم بتغيير الأحمال ليتعلم الطلبة كيفية استجابة آلات التيار المستمر وأهم خصائص هذه الآلات .و يختص أيضا هذا المختبر بدراسة كيفية السيطرة على تشغيل المحركات ثلاثية الطور وايقافها وكيفية تغيير الربط الداخلي لملفات المحرك من ربط ستار الى ربط دلتا وكيفية عكس دوران المحرك اثناء عمله وصولا الى التجارب التي تتعامل مع المحركات ثلاثية الطور. ويمكن إجراء مجموعة من التجارب بالمعمل والتى تستهدف الآتي:

- معرفه خصائص تشغيل مولدات و محركات التيار المستمر (التوالي و التوازي و المركب).
- معرفه خصائص تشغيل المحولات و فهم الأداء المتوازي للمحولات.
- فهم حاكمات الجهد الموجة الكامل ونصف الموجه ذات الوجه الواحد و الثلاثة أوجه.
- فهم خصائص الترياك و الترانزستور.
- معرفه خصائص تشغيل المحركات الحثية (ثلاثية و أحادية الأوجه).
- معرفه خصائص تشغيل للمحولات ثلاثية الأوجه و توصيلاتها المختلفة و فهم الأداء المتوازي لها.
- معرفه خصائص تشغيل للمولد و المحرك المتزامن ثلاثي الطور.
- دراسة خواص الأداء لنظم التسيير الكهربي.

- دراسة خواص الأداء للمحركات الخاصة.


DE LLORENZO

معمل القوى و الوقاية الكهربية:

يحتوى هذا المعمل على نموذج لخطوط نقل القوى ومكوناتها و لأنواع قواطع الدائرة علاوة على أجهزة الوقاية لنظم القوى الكهربية وطريقة عملها حيث يحتوى المعمل على محاكى لنظم الوقاية يتم تنفيذ مختلف التجارب المعملية والاختبارات الخاصة. ويمكن إجراء مجموعة من التجارب بالمعمل والتى تستهدف الآتي:

- تحديد ثوابت خطوط النقل و الدائرة المكافئة.
- معرفه خصائص الأداء لخطوط النقل تحت التحميل و عملية توازى خطوط النقل الكهربية.
- عملية توازى خطوط النقل الكهربية .
- التعرف على أساليب الإضاءة الكهربية و نمذجة الأحمال الكهربية و منظومات التحكم.
- دراسة خواص منظومات التحكم و الوقاية.


RA1 SUBSTATION SIMULATOR
RA2 SUBSTATION SIMULATOR
KENWOOD

معمل الجهد العالى:

يحتوى المعمل على أجهزة لتوليد وقياس واختبارات الجهد العالي وكذلك بعض المواد العازلة كهربيا يوجد بغرفة منفصلة أمام مبنى الهندسة الصناعية و الأنتاج و هذا المعمل مزود بجهاز أختبار عينات الزيت و أختبار العزل للمعدات الكهربية و ذلك تطبيق نظريات الانهيار والتفريغ عمليا.

ويمكن إجراء مجموعة من التجارب بالمعمل والتى تستهدف الآتي:

- معرفه اختبار انهيار العوازل السائله وقياس قوة عزل العوازل
- أختبارات الأنهيار فى الغازات و السوائل و اعوازل الصلية.

معمل الحاسب الألى

يوجد بالدور الخامس فى مبنى الهندسة الصناعية و الأنتاج ويخدم طلاب الفرقه الثالثة و الرابعه بالقسم من حيث التدريب على استخدام الحاسب وعمل التطبيقات الحسابيه المختلفه وبه عدد من نقاط الأنترنت و موصلة على شكل شبكة. يوجد ٢٥ جهاز كمبيوتر مكتبى مركب علية أحث البرامج التى تستخدم فى عملية المحكاة و البرمجة. أمثلة لبعض البرامج المركبة على الأجهزه:

١. برنامج ماتلاب MatLab/Simulink
٢. برنامج ايتاب ETAP Power station
٣. برنامج PSpice

جارى العمل على أضافة معمل سابع خاص بالطاقة الجديدة و المتجددة حيث بة نسبة أنجاز تصل الى ٣٠% و موجود بالفعل بعض الأجهزة الخاصة بهذا المعمل

Instructions for the Lab and Safety Rules

Instructions for the Lab and Safety Rules تعليمات عامة و قواعد الأمن للمعمل

General Instructions

1) **A**bsent will be marked if any student enters in the lab after 5 minutes.
2) **E**ach group have maximum 5 students.
3) **O**n every next lab session, a test may be conducted related to previous work.
4) **R**eport to the tutor if you find equipment that is out of order or you break something, "***no blame culture".***
5) **P**repare the written experiment report according to your tutor instructions
6) **S**moking, eating, or drinking of any kind in the lab are prohibited.
7) **N**o unapproved experiments may be performed.

Safety Rules

1) **A**t least **two persons** must be in the lab while working on live circuits.
2) **R**eport any unexpected events to your tutor.
3) **B**efore beginning to work in the lab you should be familiar with the procedure you will be following, as well as with any special precautions or changes that the tutor may note.
4) **R**emove all loose conductive jewelry and rings. (Do not wear long loose ties, or other loose clothing around machines.). **K**eep any fluids away from instruments and circuits.
5) **A**lways consider all circuits to be "energized" unless proven otherwise "dead".

6) **W**hen making measurements, only one hand at a time. No part of a live circuit should be touched.

7) **K**eep your body, or any part of it, out of the circuit.

8) **B**e as neat as possible (i.e. Keep the work area and workbench clear and clean.)

9) **A**lways check to see that the power switch is OFF before plugging into the outlet. Also, turn instrument or equipment OFF before unplugging from the outlet.

10) **A**fter assembling a circuit, check the wiring (with your lab's partners) before turning on the power.

11) **W**hen making changes in the circuit, turn off the power. Turn it on again after checking the new connections

12) **W**hen unplugging a power cord, pull on the plug, not on the cable.

13) **W**hen disassembling a circuit, first remove the source of power.

14) **R**eport immediately any doubt about electrical safety, damages, and potential hazards to the lab's tutor.

Electricity Hazards and Electrical Accidents Prevention

مخاطر الكهرباء على الأنسان Electricity Hazards

تظهر على الجسم المصاب الصدمة الكهربائية أضرار حرارية وأضرار تحليلية ، وأضرار بيولوجية فالأضرار الحرارية باحتراق الأجزاء الخارجية من الجسم ، وسخونة الأوعية الدموية والدم .. مما يؤدي إلى تعطل وظائف الجسم بشكل كبير

- الأضرار التحليلية: تتمثل في تحليل الدم والسوائل الحيوية الأخرى .. مما يؤدي إلى تخريب تركيبها الفيزيائي والكيميائي وتخريب الأنسجة بشكل عام
- الأضرار البيولوجية: تتمثل في تهيج الأنسجة الحية وتمزقها بالتزامن مع تقلصات عضلية تشنجية غير إرادية بم في ذلك عضلات القلب والرئتين ، واختلال عمليتي التنفس ودوران الدم.

مقاومة جسم الإنسان للتيار الكهربائي: جسم الإنسان يعتبر في مجمله موصلا للتيار الكهربائي إلا أن بعض أنسجته تبدي مقاومة كبيرة للتيار الكهربائي مثل الجلد والعظام والنسيج الشحمي. وفي حين يبدي النسيج العضلي والدم والنخاع الشوكي والمخ مقاومة صغيرة. وعندما يكون الجلد نظيفا وجاف ، فإن مقاومة جلد الإنسان للتيار الكهربائي تتراوح بين ٣٠٠٠ الى ١٠٠٠٠ أوم حسب الشخص العادى.

شدة التيار الكهربائي: دلت التجارب على أن أصغر تيار كهربائي يتحسس له الإنسان هو (١) مللي أمبير للتيار المتردد ذي التردد (٥٠) هرتز و(٥) مللي أمبير للتيار المستمر وهذا هو تيار الحد الشعوري ، حيث يؤدي التيار الأكبر إلى تشنج عضلي وإحساس بالألم وفي الواقع فإن شدة التيار هي العامل الحاسم الذي تقاس به شدة الصدمة الكهربائية وخطورة الإصابة. والجدول التالي يوضح قيم شدة التيار الكهربائي وتأثيرها على الإنسان:

شدة التيار	تأثير التيار على الإنسان
أقل من ١ مللي أمبير	لا يؤثر
١ الى ٨ مللي أمبير	تقلص عضلي غير مؤلم ، ويمكن للمصاب التخلص من مصدر التيار المسبب للصدمة بنفسه.
٨ الى ١٥ مللي أمبير	تقلص عضلي مؤلم ، ولكن التحكم في العضلات لا يزال ممكنا ويمكن المصاب التخلص بنفسه.

١٥ الى ٣٠ مللي أمبير	يشتد الألم وفقد المصاب التحكم في العضلات
٣٠ الى ٥٠ مللي أمبير	الألم يصبح أكثر شدة ، وكذا التقلص العضلي ويصعب التنفس
٥٠ الى ١٠٠ مللي أمبير	يحدث اختلال في وظيفة القلب يمكن أن يؤدي الى الوفاة عند بعض المصابين
١٠٠ الى ٢٠٠ مللي أمبير	توقف القلب عن العمل والمساعدة الطبية لا تجدي غالباً
أكثر من ٢٠٠ مللي أمبير	حروق شديدة وتقلص تام للعضلات

مدة تأثير التيار الكهربائي : تعتمد مقاومة جلد الإنسان على زمن تأثير التيار الكهربائي المار خلاله فهي عالية في البداية ، لكنها تتناقص مع مرور الزمن الذي يؤدي إلى ارتفاع حرارة الجلد وتأينه مما يؤدي إلى احتراقه وانخفاض مقاومته ، وهذه الظاهرة تلاحظ غالبا في شبكات الضغط المنخفض ، ومع ذلك فإن رد الفعل الانعكاسي لدى المصاب تبعده نتيجة تأثير المراكز العصبية.

تأثير الجهد الكهربائي: إن مقاومة الجهد الإنساني تتناقص بازدياد الجهد المطبق عليه ، وقد دلت التجارب على أن جهداً مقداره (١٢ – ١٥) فولت لا يؤثر على الإنسان ويتراوح جهد اللمس المسموح به ما بين (٥٠ – ٦٠) فولت،

تأثير التردد: أظهرت التجارب أن التيار المستمر اقل خطرا من التيار المتردد ذي التردد الصناعي (٥٠) هرتز ، والجهد (٣٠٠-٢٥٠) فولت. ومع زيادة تردد التيار تتناقص ممانعة جسم الإنسان بسبب وجود مركبة صعوبة ، مما يؤدي إلى زيادة شدة التيار ، ويبقى هذا الأمر صحيحا في مجال التردد (٦٠-٥٠) هرتز فقط ، حيث أن ازدياد التردد في الواقع يتوافق مع تناقص خطورة الضرر الذي يختفي عند التردد (٥٠٠-٤٥٠) كيلو هرتز ، ولكن مع بقاء خطورة مرور التيار عبر جسم الإنسان.

وهناك نظريات عديدة تفسر تأثير تردد التيار على جسم الإنسان ،أكثرها مطابقة للواقع تلك التي تقول : إن مرور التيار الكهربائي عبر جسم الإنسان يؤدي إلى تحلل الأجزاء المكونة لخلايا الجسم وتحولها إلى أيونات ذات قطبية مختلفة تتحرك في الاتجاه المعاكس لقطبيتها الأصلية حتى تصل إلى الخلية فتؤدي بهذه الحركة إلى تفكك الخلية وخاصة في الجهاز العصبي ، وتأخذ هذه الحركة والمسافة التي تقطعها الأيونات ضمن الخلية قيمتها

العظمى عند التردد (٦٠-٤٠) هرتز ، أما عند ارتفاع التردد فان الحركة تقل ولا تستطيع الأيونات الانتقال من طرف لآخر في الخلية نفسها وعليه فإن التيار الكهربائي ذي التردد (٦٠-٥٠) هرتز يحمل أكبر خطر على الإنسان. مسارات التيار الكهربائي المحتملة عبر جسم الإنسان: أكثر هذه الحالات خطرا في الاحتمال – يد يمنى – قدمين.

أنواع الإصابة بالتيار الكهربائي:

- الصدمة الكهربائية: وهي عبارة عن الأضرار التي تصيب أنسجة الجسم تأثير التيار الكهربائي والقوس الكهربائي. وتكمن الخطورة في درجة تضرر الأنسجة ورد فع الأعضاء. فإذا كانت الحروق شديدة فإنها تؤدي إلى الوفاة ليس بسبب التكهرب ولكن بسبب التضرر العضوي. ومن مظاهر الصدمة الكهربائية: الحروق الكهربائية - الندبات - تمعدن الجلد - أضرار فيزيائية
- الصعقة الكهربائية: وهي عبارة عن التهيج الذي يصيب الأنسجة الحية نتيجة مرور التيار الكهربائي خلال جسم الإنسان ويكون عادة مترافقاً مع تقلص وتشنج عضلي غير إرادي. و فقدان الوعي واختلال عمل القلب والتنفس أو كليهما معاً.

الوقاية من حوادث الكهرباء Electrical Accidents Prevention

يتم إتباع الإجراءات الآتية للوقاية من حوادث الكهرباء:

١. يجب فصل التيار الكهربائي عن أية معدة أو جهاز كهربائي قبل إجراء أية عمليات صيانة عليه مع وضع لافتة (TAG) عند مكان فصل التيار الكهربائي.

٢. لا تلبس الخواتم والساعات والمجوهرات عند العمل قرب الدوائر الكهربائية.

٣. لا تستعمل السلالم المعدنية أو العدد اليدوية غير المعزولة عند العمل في الأجهزة الكهربائية.

٤. يجب التأكد من أن جميع الأجهزة والمعدات الكهربائية الثابتة والمتحركة موصولة بالأرض بواسطة سلك وهذا السلك لا يحمل تيارا كهربائيا. لذا يجب التأكد باستمرار من سلامة الوصلة الأرضية للمعدة.

٥. تقوم الفيوزات (Fuses) وقواطع التيار (Circuit Breaker) لفصل الدائرة الكهربائية ، لا تحاول إرجاع التيار قبل البحث عن سبب العطل وإصلاحه .

٦. -لا تحمل مصدر التيار بأكثر من طاقته حيث يؤدي ذلك لحدوث حريق.

٧. لا تمرر الأسلاك الكهربائية من خلال الأبواب أو النوافذ وإبعدها عن المصادر الحرارية كالدفايات ولا تعلقها علي المسامير.

٨. لا تتغاضي عن الأجزاء المتآكلة في الأسلاك الكهربائية وقم بتبديلها فورا أو تغطيتها بشريط عازل بصفة مؤقتة لحين تبديلها.

٩. يجب أن يتدرب العاملون في مجال الكهرباء علي استخدام طفايات الحريق المناسبة للإستعمال في حرائق الكهرباء ، وهي طفايات البودرة وطفايات ثاني أكسيد الكربون وطفايات الهالون .

١٠. في حالة إصابة أي شخص بصدمة كهربائية يجب عدم ملامسته علي الإطلاق والقيام أولا بفصل التيار الكهربائي وإبعاد الشخص عن مصدر التيار الكهربائي بواسطة لوح أو قطعة من الخشب أو أية مادة عازلة أخري ، وبعد ذلك يمكن إجراء الإسعافات الأولية (إذا كان الشخص مدربا علي ذلك) وتشمل التنفس الصناعي للشخص المصاب ، ويتم استدعاء الطبيب علي الفور أو نقل المصاب إلي أقرب مستشفي.

List of experiments

1st Year Electrical – 1st term

SN	Title of the experiment
1	Simple connections of resistors.
2	The voltage divider.
3	The superposition theorem.
4	Thevenin's theorem.
5	Series RL circuits.
6	Series RC circuits.
7	Series resonance.

2nd Year Electrical – 2nd term

SN	Title of the experiment
1	Determination of single phase transformer parameters.
2	Load test on 1-ph transformer.
3	Load test of DC shunt and series motor.

3rd Year Electrical – 1st term

SN	Title of the experiment
1	Introduction to DC machine and measuring the winding resistance.
2	No load test of DC separately excited generator.
3	Load test of DC separately excited generator.
4	No load test of DC shunt generator.
5	Load test of DC shunt generator.
6	Load test of DC compound generator.
7	No load test of DC shunt motor.
8	Load test of DC shunt motor.
9	Load test of DC compound generator.
10	Measurement of three-phase power.
11	Dielectric strength of insulating oil.
12	Breakdown in gases.

3rd Year Electrical – 2nd term

SN	Title of the experiment
1	Transmission line parameters.
2	Voltage regulation and voltage drop along transmission line.
3	Breakdown in dielectric liquids.
4	High resistance measurement.
5	single-phase half-wave uncontrolled rectifier.
6	single-phase full-wave uncontrolled rectifier.
7	Three-phase uncontrolled rectifier.
8	Parameter determination of three-phase transformer.
9	Three-phase transformer connecting groups.

4th Year Electrical – 1st term

SN	Title of the experiment
1	Open circuit and short circuit tests on 3-phase transformer.
2	Load test on 3-phase transformer.
3	Different connections of 3-phase transformer.
4	Open delta and scott connected transformers.
5	No load and blocked rotor tests on 3-phase induction motor.
6	Load test on 3-phase induction motor.
7	Load test on 3-phase induction motor under varying supply voltage.
8	Starting and braking of 3-phase squirrel cage induction motor.
9	No load and blocked rotor tests on 1-phase induction motor.
10	Load test on 1-phase induction motor.

4thYear Electrical – 2ndterm

SN	Title of the experiment
1	No load and short circuit tests on a 3-phase synchronous machine.
2	Load test on 3-phase synchronous generator.
3	Zero power factor test on a 3-phase synchronous generator.
4	Synchronization of synchronous machine.
5	Determination of direct and quadrature reactances of synchronous machine.
6	V- curves and inverted V-curves of a 3-phase synchronous motor.
7	Load test on a 3-phase synchronous motor.
8	Load test on a 3-phase synchronous motor under varying supply voltage.
9	Determination of universal motor parameters.
10	Load test on universal motor.
11	Time current characteristics of over current relay.

List of proposed experiments

1st Year Electrical – 1st term

SN	Title of the experiment
1	Measurement of resistance using ammeter-voltmeter method.
2	Measurement of internal resistance of an ammeter and a voltmeter.
3	Determination of equivalent resistance of series and parallel DC electric circuits.
4	Verification of voltage and current dividers.
5	Verification of Kirchhoff's laws in AC circuits.
6	To verify experimentally Superposition's theorem in DC circuits.
7	To verify experimentally Thevenin's theorem in DC circuits and obtain the maximum power.
8	Measurement of capacitance and inductance.
9	Measurement of power in 1-phase AC circuits.
10	Measurement of power factor at different loading conditions.

2nd Year Electrical – 2nd term

SN	Title of the experiment
1	Measurements of electric power in 1-phase and 3-phase balanced circuits.
2	Measurements of resistors, inductors and capacitors using bridges.
3	Determining parameters of 1-phase transformer equivalent circuit.
4	No-load test of separately excited DC generator to plot the magnetization curve.
5	Study the diode characteristic and free-wheeling diode and to Plot V-I characteristics.
6	To obtain the V-I characteristic of thyristor.
7	To draw wave shape of the electrical signal at input and output points of controlled and uncontrolled 1-phase rectifiers (half-wave and full-wave) for resistive and inductive loads.
8	To draw wave shape of the electrical signal at input and output points of controlled and uncontrolled 3-phase rectifiers (half-wave and full-wave) for resistive and inductive loads.

3rd Year Electrical – 1st term

SN	Title of the experiment
1	Carry out load tests of DC separately excited generator.
2	Carry out load tests of DC shunt generator.
3	Carry out load tests of DC series generator.
4	Carry out load tests of DC compound generator.
5	Carry out load tests of DC separately excited motor.
6	Carry out load tests of DC shunt motor.
7	Carry out load tests of DC series motor.
8	Carry out load tests of DC compound motor.
9	Carry out speed control of DC motors.
10	Experimentally achieve braking of DC motors.
11	Separation of iron losses of 1-phase transformer.
12	Carry out polarity test of 1-phase transformer.
13	Run load test of 1-phase transformer.
14	Achieve paralleling of two 1-phase transformers.

3rdYear Electrical – 2nd term

SN	Title of the experiment
1	Measurement of breakdown voltage of oil sample.
2	Carry out failure tests of gaseous, liquid and solid insulating materials.
3	Insulation resistance measurement using Megger.
4	Determination of constants of transmission lines.
5	Study the performance characteristics of loaded transmission lines.
6	Operation of transmission lines in parallel.
7	Study varying voltage with active and reactive power of transmission lines.
8	To obtain Triac characteristic.
9	To obtain characteristic of power transistor.
10	Single phase AC voltage controller (half-wave and full-wave) for resistive and inductive loads.
11	Three phase AC voltage controller (half-wave and full-wave) for resistive and inductive loads.

4th Year Electrical – 1st term

SN	Title of the experiment
1	Determining the equivalent circuit of 3-phase transformer.
2	Carry out load test of 3-phase transformer.
3	Perform different connection of 3-phase transformer and their tests.
4	Configurations of special connections of 3-phase transformer (open delta and T-T).
5	Operation of a 3-phase transformers in parallel.
6	Determination of the equivalent circuit of 3-phase induction motor.
7	Carry out the load test of 3-phase induction motor (constant voltage and voltage variation).
8	Study the performance characteristic of 3-phase induction motor using SCRs
9	Perform starting and speed control of 3-phase induction motor.
10	Determination of the equivalent circuit of 1-phase induction motor
11	Study the performance characteristic of 1-phase induction motor
12	Perform starting and speed control of 1-phase induction motor
13	Measuring illumination intensity.

4thYear Electrical – 2ndterm

SN	Title of the experiment
1	Determination of the equivalent circuit of 3-phase synchronous machines.
2	Carry out load test of 3-phase synchronous generator at different power factor values.
3	Perform zero power factor test of synchronous generator and voltage regulation.
4	Perform paralleling of synchronous generators.
5	Obtain V-curves of synchronous machine.
6	Perform speed control of synchronous motor.
7	Carry out load test of synchronous motor at voltage variation.
8	Study the performance characteristics of electric drives (induction – synchronous)
9	Perform Power factor correction.
10	Study the performance characteristics of repulsion, universal and reluctance motors.
11	Carry out tests on current and voltage transformers.
12	Calibration test of protective relays using secondary injection unit.
13	Measurement of gain and constants of control system.

Experiment's Information Card

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Experiment's Information Card

Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(1)
Title of Experiment	:	SIMPLE CONNECTIONS OF RESISTORS
Objectives of the experiment	:	Differentiating between series and parallel connection of resistors. Calculating the equivalent resistance of series, parallel and series/parallel connected resistors. Calculating the currents and voltages in series, parallel and series/parallel connected resistors. Verifying experimentally Kirchoffk's laws. checking the power balance of the circuit
Materials Required	:	None
Equipment & Tools	:	DC power supply. Voltmeters. Ammeters. Resistors of different values.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(2)
Title of Experiment	:	THE VOLTAGE DIVIDER
Objectives of the experiment	:	Applying the voltage divider rule to series resistive circuits. Designing a voltage divider circuit to meet a specific voltage output. Confirming experimentally the circuit designed above. Determining the range of voltages available when a variable resistor is used in a voltage divider.
Materials Required	:	None
Equipment & Tools	:	DC power supply. Voltmeters. Ammeters. Resistors of different values.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(3)
Title of Experiment	:	THE SUPERPOSITION THEOREM
Objectives of the experiment	:	Applying the superposition theorem to linear circuits with more than one voltage source. Constructing a circuit with two voltage sources. solveing for the currents and voltages in the circuit Verifying the computations by measurements.
Materials Required	:	None
Equipment & Tools	:	DC power supply. Voltmeters. Ammeters. Resistors of different values.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(4)
Title of Experiment	:	THEVENIN'S THEOREM
Objectives of the experiment	:	Changing a linear network containing several resistors into an equivalent Thevenin's circuit Proving the equivalency of the network with the Thevenin's circuit by comparing the effects of various load resistors.
Materials Required	:	None
Equipment & Tools	:	DC power supply. Voltmeters. Ammeters. Resistors of different values.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(5)
Title of Experiment	:	SERIES RL CIRCUITS
Objectives of the experiment	:	Calculating the inductive reactance of an inductor from voltage measurements in a series RL circuit. Drawing the impedance and voltage phasor diagrams for series RL circuit. Measuring the phase angle in a series circuit using oscilloscope.
Materials Required	:	None
Equipment & Tools	:	AC power supply. Voltmeters. Ammeters. Resistors. Inductors. Oscilloscope.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(6)
Title of Experiment	:	SERIES RC CIRCUITS
Objectives of the experiment	:	Calculating the capacitive reactance of a capacitor from voltage measurements in a series RC circuit. Drawing the impedance and voltage phasor diagrams for series RC circuit. Explaining how frequency affects the impedance and voltage phasors in a series RC circuit.
Materials Required	:	None
Equipment & Tools	:	AC power supply. Voltmeters. Ammeters. Resistors. Capacitors. Oscilloscope.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	1st Electric
Semester	:	1st
Experiment No.	:	(7)
Title of Experiment	:	SERIES RESONANCE
Objectives of the experiment	:	Calculating the resonant frequency, quality factor and bandwidth of a resonant circuit. Measuring the parameters listed in above objective. Explaining the factors affecting the selectivity of a series resonant circuit.
Materials Required	:	None
Equipment & Tools	:	AC power supply. Voltmeters. Ammeters. Resistors. Inductors. Capacitors. Oscilloscope.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	2nd Electric
Semester	:	2nd
Experiment No.	:	(1)
Title of Experiment	:	DETERMINATION OF SINGLE PHASE TRANSFORMER PARAMETERS
Objectives of the experiment	:	Calculate the parameters of 1-ph transformer. Measure the iron losses and full load copper losses of 1-ph transformer. Plot the graph between iron losses and applied voltage of 1-ph transformer. Plot the graph between copper losses and applied current of 1-ph transformer. Check turns ratio of transformer.
Materials Required	:	None
Equipment & Tools	:	1-ph transformer. Variable 1-ph power supply. One wattmeter. One AC voltammeter. One AC ammeter. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	2nd Electric
Semester	:	2nd
Experiment No.	:	(2)
Title of Experiment	:	LOAD TEST ON 1-PHASE TRANSFORMER
Objectives of the experiment	:	Calculate the voltage regulation and efficiency of 3-ph transformer. Study the change of voltage regulation and efficiency with load current of 1-ph transformer.
Materials Required	:	None
Equipment & Tools	:	1-ph transformer. Variable 1-ph power supply. Two wattmeters. One AC voltammeter. One AC ammeters. Variable 1-ph resistive, inductive and capacitive loads. Connection wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	2nd Electric
Semester	:	2nd
Experiment No.	:	(3)
Title of Experiment	:	LOAD TEST OF DC SHUNT AND SERIES MOTORS
Objectives of the experiment	:	Study variations of speed with load torque, speed with load current, torque with load current for both shunt and series motors
Materials Required	:	None
Equipment & Tools	:	DC motor. Variable DC Supply. One voltmeter. One ammeter. Mechanical load. Tachometer. torque measuring devices
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(1)
Title of Experiment	:	INTRODUCTION TO DC MACHINE AND MEASURING THE WINDING RESISTANCE
Objectives of the experiment	:	Recognize the concept of DC machine. Determine the unknown resistance.
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. One ammeter
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(2)
Title of Experiment	:	NO LOAD TEST OF DC SEPARATELY EXCITED GENERATOR
Objectives of the experiment	:	To get the magnetization curve at different speeds
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. One ammeter. Tachometer
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(3)
Title of Experiment	:	LOAD TEST OF DC SEPARATELY EXCITED GENERATOR
Objectives of the experiment	:	Study variation of load voltage, efficiency and regulation with load current. Study variation of field current with load current at constant load voltage.
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. Two ammeters. Tachometer
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(4)
Title of Experiment	:	NO LOAD TEST OF DC SHUNT GENERATOR
Objectives of the experiment	:	magnetization curve with variable R_{fg}, no load losses
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. One ammeter. Tachometer
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(5)
Title of Experiment	:	LOAD TEST OF DC SHUNT GENERATOR
Objectives of the experiment	:	Study variation of load voltage, efficiency and voltage regulation with load current
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. Two voltmeters. Two ammeters. Tachometer
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(6)
Title of Experiment	:	LOAD TEST OF DC COMPOUND GENERATOR
Objectives of the experiment	:	Variation of load voltage with load current in case of commutative and differential compound
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. One ammeter. Tachometer
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(7)
Title of Experiment	:	NO LOAD TEST OF DC SHUNT MOTOR
Objectives of the experiment	:	Determination of mechanical losses, iron losses and copper losses Variation of absorbed power as a function of applied voltage Variation of the ratio (P_{abs}/N) with speed variation
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. two ammeter. Tachometer
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(8)
Title of Experiment	:	LOAD TEST OF DC SHUNT MOTOR
Objectives of the experiment	:	Study variations of input current, speed, efficiency and losses with load current
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. One ammeter. Tachometer. torque measuring devices
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(9)
Title of Experiment	:	LOAD TEST OF DC COPMOUND MOTOR
Objectives of the experiment	:	Variation of speed with armature current
Materials Required	:	None
Equipment & Tools	:	Variable DC Supply. One voltmeter. One ammeter. Tachometer. torque measuring devices
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(10)
Title of Experiment	:	MEASUREMENT OF THREE-PHASE POWER
Objectives of the experiment	:	Measuring power in 3-ph circuit with balanced load by one-wattmeter and two-wattmeter methods. Measuring the power factor
Materials Required	:	None
Equipment & Tools	:	Variable 3-ph AC supply. Three voltmeters. Three ammeters. Two wattmeters. 3-ph variable load.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(11)
Title of Experiment	:	DIELECTRIC STRENGTH OF INSULATING OIL
Objectives of the experiment	:	Measuring the dielectric strength of various samples of transformer oil. Investigate the effects of impurities on the dielectric strength.
Materials Required	:	None
Equipment & Tools	:	Oil tester set at high voltage lab.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	First
Experiment No.	:	(12)
Title of Experiment	:	BREAKDOWN IN GASES
Objectives of the experiment	:	Measuring the dielectric strength of gases at different temperature and pressure. Investigate the effects of gap variation on the breakdown voltage.
Materials Required	:	None
Equipment & Tools	:	Sphere gap set at high voltage lab.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(1)
Title of Experiment	:	TRANSMISSION LINE PARAMETERS
Objectives of the experiment	:	To obtain the parameters of a transmission line model by applying the open and short circuit tests and refereeing these parameters to the actual transmission line.
Materials Required	:	None
Equipment & Tools	:	Transmission line model 220 V, 5 A. AC power supply 50 Hz, 0:220 V, 5 A. Three wattmeters 30 V, 5A. Three Ammeters 5 A. Three Voltmeters 130 V. Connection leads.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(2)
Title of Experiment	:	VOLTAGE REGULATION AND VOLTAGE DROP ALONG TRANSMISSION LINES
Objectives of the experiment	:	To measure the voltage drop across a transmission line with different load current magnitudes and power factors. Study the effect of line capacitance on voltage regulation.
Materials Required	:	None
Equipment & Tools	:	Transmission line model 220 V, 5 A. AC power supply 50 Hz, 0:220 V, 5 A. Three Ammeters 5 A. Three Voltmeters 130 V. Connection leads. Resistive, inductive and capacitive load banks.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(3)
Title of Experiment	:	BREAKDOWN IN DIELECTRIC LIQUIDS
Objectives of the experiment	:	To measure non-uniform breakdown field in dielectric liquids, such as transformer oil, capacitor oil, circuit breaker oil, cable oil, etc.
Materials Required	:	None
Equipment & Tools	:	High voltage AC supply. Transparent test cell, fitted with sphere to plane electrodes. High resistance 0.5 MΩ.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(4)
Title of Experiment	:	HIGH RESISTANCE MEASUREMENT
Objectives of the experiment	:	To measure high resistances, such as electric insulation resistance of machines, transformers, pin insulators, suspension insulators, bushing, etc.
Materials Required	:	None
Equipment & Tools	:	Meg-ohmmeter. Pin type insulator. Suspension insulators units.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(5)
Title of Experiment	:	SINGLE-PHASE HALF-WAVE UNCONTROLLEDD RECTIFIER
Objectives of the experiment	:	To measure and sketch the waveform of output voltage of single-phase half-wave uncontrolled rectifier when connected with resistive load and series R-L load with and without freewheeling diode. And to implement experimentally the relation between the average and rms values of the voltage wave.
Materials Required	:	None
Equipment & Tools	:	Diode rectifier model. AC power supply 50 Hz, 0:220 V, 5 A. Oscilloscope. One Ammeter 5 A. Two Voltmeters 220 V. Connection leads. Resistive load bank.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(6)
Title of Experiment	:	SINGLE-PHASE FULL-WAVE UNCONTROLLED RECTIFIER
Objectives of the experiment	:	To measure and sketch the waveform of output voltage of single-phase full-wave uncontrolled rectifier when connected with resistive load and series R-L load with and without freewheeling diode. And study the effect of adding a capacitor in parallel with the load.
Materials Required	:	None
Equipment & Tools	:	Diode rectifier model. AC power supply 50 Hz, 0:220 V, 5 A. Oscilloscope. One Ammeter 5 A. Two Voltmeters 220 V. Connection leads. Resistive load bank. Capacitor
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(7)
Title of Experiment	:	THREE-PHASE UNCONTROLLEDD RECTIFIER
Objectives of the experiment	:	To measure and sketch the waveform of output voltage of three-phase half-wave uncontrolled rectifier and three-phase bridge rectifier when connected with resistive load.
Materials Required	:	None
Equipment & Tools	:	Diode rectifier model. AC power supply 50 Hz, 0:220 V, 5 A. Oscilloscope. One Ammeter 5 A. Two Voltmeters 220 V. Connection leads. Resistive load bank.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(8)
Title of Experiment	:	PARAMETER DETERMINATION OF THREE-PHASE TRANSFORMER
Objectives of the experiment	:	Determining experimentally the equivalent circuit parameters of three-phase transformer, core losses, rated copper losses, no-load exciting current, and the no-load power factor. Then studying the relation between iron losses and applied voltage on the transformer, and the relation between copper losses and the load current through the transformer.
Materials Required	:	None
Equipment & Tools	:	Three-phase transformer 2x190 V/ 2x65 V, 2.8 KVA. AC power supply 50 Hz, 0:400 V, 17 A. One wattmeter. One AC voltammeter 720 V. One AC ammeter 20 A. Connection leads.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	3rd Electric Power
Semester	:	2nd
Experiment No.	:	(9)
Title of Experiment	:	THREE-PHASE TRANSFORMER CONNECTING GROUPS
Objectives of the experiment	:	To recognize the different ways of connecting three-phase transformers, and to deduce the phase shift between line voltages in primary and secondary windings in each case.
Materials Required	:	None
Equipment & Tools	:	Three-phase transformer 2x190 V/ 2x65 V, 2.8 KVA. AC power supply 50 Hz, 0:220 V, 17 A. Two-channel oscilloscope. Connection leads
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(1)
Title of Experiment	:	OPEN CIRCUIT AND SHORT CIRCUIT TESTS ON 3-PHASE TRANSFORMER
Objectives of the experiment	:	Calculate the parameters of 3-ph transformer. Measure the iron losses and full load copper losses of 3-ph transformer. Plot the graph between iron losses and applied voltage of 3-ph transformer. Plot the graph between copper losses and applied current of 3-ph transformer.
Materials Required	:	None
Equipment & Tools	:	3-ph transformer. Variable 3-ph power supply. One wattmeter. One AC voltammeter. One AC ammeter. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(2)
Title of Experiment	:	LOAD TEST ON 3-PHASE TRANSFORMER
Objectives of the experiment	:	Calculate the voltage regulation and efficiency of 3-ph transformer. Study the change of voltage regulation and efficiency with load current of 3-ph transformer.
Materials Required	:	None
Equipment & Tools	:	3-ph transformer. Variable 3-ph power supply. Two wattmeters. Two AC voltammeters. Two AC ammeters. Connection wires. Variable 3-ph load
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(3)
Title of Experiment	:	DIFFERENT CONNECTIONS OF 3-PHASE TRANSFORMER
Objectives of the experiment	:	Recognize the different ways of connecting transformer windings, for 3-ph transformer. Specify the phase shift between the line voltages in the high voltage and low voltage windings in each connection. Deduce the phase shift and the ratio between the line voltages in the high voltage and low voltage windings in each connection. Recognize the vector groups of 3-ph transformer.
Materials Required	:	None
Equipment & Tools	:	3-ph transformer. Variable 3-ph power supply. Oscilloscope. Connection Wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(4)
Title of Experiment	:	OPEN DELTA AND SCOTT CONNECTED TRANSFORMERS
Objectives of the experiment	:	Recognize the way of connecting two 1-ph transformers to get a 3-ph open delta transformer. Recognize the way of connecting two 1-ph transformers to get a 3-ph Scott connected transformer (3-ph to 3-ph transformation and 3-ph to 2-ph transformation).Specify the phase shift between the secondary voltages in of each 1-ph transformers.
Materials Required	:	None
Equipment & Tools	:	Three 1-ph transformers. Variable 3-ph power supply. Oscilloscope. Three voltmeters. Two watt meters, One Ammeter. Variable 3-ph load. Connection Wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(5)
Title of Experiment	:	NO LOAD AND BLOCKED ROTOR TESTS ON 3-PHASE INDUCTION MOTOR
Objectives of the experiment	:	Determine the parameters of the 3-ph induction motor. Determine the rotational losses and full load copper losses of the 3-ph induction motor. Determine the change of rotational losses and no load current with applied voltage for 3-ph induction motor. Determine the change of copper losses and voltage with applied current for 3-ph induction motor.
Materials Required	:	None
Equipment & Tools	:	3-ph induction motor. Variable 3-ph power supply. Two wattmeters. One AC voltammeter. One AC ammeter. Connection wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(6)
Title of Experiment	:	LOAD TEST ON 3-PHASE INDUCTION MOTOR
Objectives of the experiment	:	Determine the load characteristics of 3-ph induction motor. Study the variation of motor speed, current, power factor, output power, rotational losses, copper losses and total losses with the applied torque of 3-ph induction motor.
Materials Required	:	None
Equipment & Tools	:	3-ph induction motor. Variable 3-ph power supply. Variable DC source. One AC ammeter. One AC voltmeter. Two wattmeters. Tachometer. Torque meter. Brake. Brake supply. Connection Wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(7)
Title of Experiment	:	LOAD TEST ON 3-PHASE INDUCTION MOTOR UNDER VARYING SUPPLY VOLTAGE
Objectives of the experiment	:	Determine load characteristics of 3-ph induction motor at different supply voltages. Deduce the variation of the motor speed, current, power factor, efficiency, rotational losses, copper losses and total losses with the applied torque at different supply voltages.
Materials Required	:	None
Equipment & Tools	:	3-ph induction motor. Variable 3-ph power supply. Variable DC source. One AC ammeter. One AC voltmeter. Two wattmeters. Tachometer. Torque meter. Brake. Brake supply. Connection Wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(8)
Title of Experiment	:	STARTING AND BRAKING OF 3-PHASE SQUIRREL CAGE INDUCTION MOTOR
Objectives of the experiment	:	Study the starting of 3-ph induction motor by primary resistance, auto transformer, and star-delta switch. Study the braking of 3-ph induction motor by DC source. Study the braking of 3-ph induction motor by plugging.
Materials Required	:	None
Equipment & Tools	:	Variable 3-ph power supply. Variable DC source. 3-ph squirrel cage induction motor. 3-ph resistor bank. 3-ph autotransformer. Star-delta switch. One AC ammeter. One AC voltmeter. Connection Wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(9)
Title of Experiment	:	NO LOAD AND BLOCKED ROTOR TESTS ON 1-PHASE INDUCTION MOTOR
Objectives of the experiment	:	Determine the parameters of the 1-ph induction motor. Determine the rotational losses and full load copper losses of the 1-phase induction motor. Determine the change of rotational losses and no load current with applied voltage. Determine the change of copper losses and voltage with applied current.
Materials Required	:	None
Equipment & Tools	:	1-ph induction motor. 1-ph AC power supply. DC supply. One AC ammeter. One AC voltmeter. One DC ammeter. One DC voltmeter. One wattmeter. Tachometer. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	1st
Experiment No.	:	(10)
Title of Experiment	:	LOAD TEST ON 1-PHASE INDUCTION MOTOR
Objectives of the experiment	:	Determine the load characteristics of 1-ph induction motor. Study the variation of motor speed, current, power factor, output power, rotational losses, copper losses and total losses with the applied torque of 1-ph induction motor.
Materials Required	:	None
Equipment & Tools	:	1-ph induction motor. Variable 1-ph AC power supply. Variable DC supply. One AC ammeter. One AC voltmeter. One wattmeter. One DC ammeter. One DC voltmeter. One wattmeter. Tachometer. Torque meter. Brake. Brake supply. Connection Wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(1)
Title of Experiment	:	NO LOAD AND SHORT CIRCUIT TESTS ON A 3-PHASE SYNCHRONOUS MACHINE
Objectives of the experiment	:	Perform no load test and short circuit test on a 3-phase synchronous machine. Plot the variation graph of armature voltage with field current at no load test on a 3-phase synchronous machine (no load characteristics). Plot the variation graph of armature current with field current at short circuit test on a 3-phase synchronous machine (short circuit characteristics). Specify the synchronous impedance of a 3-phase synchronous machine. Plot the variation graph of synchronous impedance with field current. Specify the rotational losses and full load copper losses of a 3-phase synchronous machine. Plot the variation graph of rotational losses with armature voltage at no load on a 3-phase synchronous machine. Plot the variation graph of copper losses with armature current at short circuit on a 3-phase synchronous machine.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous machine. DC compound motor (prime mover). Two-variable DC power supply. One AC voltammeter. One DC voltammeter. One AC ammeter. One DC ammeter. Tachometer. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(2)
Title of Experiment	:	LOAD TEST ON A 3-PHASE SYNCHRONOUS GENERATOR
Objectives of the experiment	:	Perform load test on 3-phase synchronous generator at different power factors. Specify the voltage regulation of 3-phase synchronous generator at different power factors. Plot the graph between terminal voltage and load current on 3-phase synchronous generator at different power factors. Plot the graph between voltage regulation and load current on 3-phase synchronous generator at different power factors.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous machine. DC compound motor (prime mover). Two-variable DC power supply. One AC voltammeter. One DC voltammeter. One AC ammeter. Tachometer. Variable 3-ph resistive load. Variable 3-ph inductive load. Variable 3-ph capacitive load. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(3)
Title of Experiment	:	ZERO POWER FACTOR TEST ON A 3-PHASE SYNCHRONOUS GENERATOR
Objectives of the experiment	:	Perform zero power factor test on 3-phase synchronous generator. Plot the zero power factor characteristics of a 3-phase synchronous generator. Specify the armature leakage reactance of 3-phase synchronous generator. Specify the armature reaction mmf of 3-phase synchronous generator.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous machine. DC compound motor (prime mover). Two-variable DC power supply. One AC voltammeter. One DC ammeter. One AC ammeter. Tachometer. Variable 3-ph inductive load. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(4)
Title of Experiment	:	SYNCHRONIZATION OF SYNCHRONOUS MACHINE
Objectives of the experiment	:	Recognize the way of connecting a synchronous machine in parallel with the power grid. Specify the requirement conditions for successful synchronization.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous machine. DC compound motor (prime mover). Two-variable DC power supply. Two-AC voltammeter. Frequency meter. 3-ph switch. Tachometer. Phase sequence indicator. Synchroscope. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(5)
Title of Experiment	:	DETERMINATION OF DIRECT AND QUADRATURE REACTANCES OF SYNCHRONOUS MACHINE
Objectives of the experiment	:	Perform slip test to specify the direct and quadrature reactances of salient pole synchronous machine. Specify the direct and quadrature reactances of salient pole synchronous machine. Plot the variation graph of the direct and quadrature reactances with armature voltage on 3-phase salient pole synchronous machine.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous machine. DC compound motor (prime mover). One-variable DC power supply. Two-AC voltammeter. One-AC ammeter. 3-ph supply. Tachometer. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(6)
Title of Experiment	:	V-CURVES AND INVERTED V-CURVES OF A 3-PHASE SYNCHRONOUS MOTOR
Objectives of the experiment	:	Perform load test on 3-phase synchronous motor at different excitation. Plot the variation graph of the armature current with excitation current of a 3-phase synchronous motor at constant power (V-Curves). Plot the variation graph of the input power factor with excitation current of a 3-phase synchronous motor at constant power (Inverted V-Curves).
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous motor. Variable 3-ph power supply. Two-Variable DC source. Two Ammeter (1-AC ammeter and 1-DC ammeter). AC voltmeter. Wattmeter. Tachometer. Torque meter. Brake. Brake supply. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(7)
Title of Experiment	:	LOAD TEST ON A 3-PHASE SYNCHRONOUS MOTOR
Objectives of the experiment	:	Perform load test on a 3-phase synchronous motor. Specify the load characteristics of a 3-phase synchronous motor during various loading conditions. Plot the variation graph of the motor speed with the applied torque of a 3-phase synchronous motor. Plot the variation graph of the motor current with the applied torque of a 3-phase synchronous motor. Plot the variation graph of the motor power factor and efficiency with the applied torque of a 3-phase synchronous motor. Plot the variation graph of the motor output power and input power with the applied torque of a 3-phase synchronous motor. Plot the variation graph of the motor rotational losses, copper losses and total losses with the applied torque of a 3-phase synchronous motor.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous motor. Variable 3-ph power supply. Two-Variable DC source. One AC ammeter. One AC voltmeter. One Wattmeter. Tachometer. Torque meter. Brake. Brake supply. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(8)
Title of Experiment	:	LOAD TEST ON A 3-PHASE SYNCHRONOUS MOTOR UNDER VARYING SUPPLY VOLTAGE
Objectives of the experiment	:	Perform load test on a 3-phase synchronous motor under varying supply voltage. Specify load characteristics of a 3-phase synchronous motor at different supply voltages. Plot the variation of motor speed with the applied torque at different supply voltages. Plot the variation of motor current with applied torque at different supply voltages. Plot the variation of motor power factor with applied torque at different supply voltages. Plot the variation of the efficiency with applied torque at different supply voltages. Plot the variation graph of the motor rotational losses, copper losses and total losses with the applied torque at different supply voltages.
Materials Required	:	None
Equipment & Tools	:	3-ph synchronous motor. Variable 3-ph power supply. Two-Variable DC source. One AC ammeter. One AC voltmeter. Wattmeter. Tachometer. Torque meter. Brake. Brake supply. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(9)
Title of Experiment	:	DETEMINATION OF UNIVERSAL MOTOR PARAMETERS
Objectives of the experiment	:	Perform blocked rotor test and no load test on universal motor. Specify the parameters of universal motor. Specify the rotational losses of universal motor. Plot the variation graph of rotational losses, current, speed and power factor with applied voltage at no load on universal motor.
Materials Required	:	None
Equipment & Tools	:	1-ph AC voltage source. Universal motor. Wattmeter. One AC ammeter. One AC voltammeter. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(10)
Title of Experiment	:	LOAD TEST ON UNIVERSAL MOTOR
Objectives of the experiment	:	Plot the variation graph of the applied torque with the motor speed of universal motor. Plot the variation graph of the motor current with the applied torque of universal motor. Plot the variation graph of the motor power factor and efficiency with the applied torque of universal motor. Plot the variation graph of the motor output power and input power with the applied torque of universal motor.
Materials Required	:	None
Equipment & Tools	:	Universal motor. Variable 1-ph power supply. Variable DC source. AC ammeter. AC voltmeter. Wattmeter. Tachometer. Torque meter. Brake. Brake supply. Connection wires.
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

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Experiment's Information Card

Year	:	4th Electric Power
Semester	:	2nd
Experiment No.	:	(11)
Title of Experiment	:	TIME-CURRENT CHARACTERISTCS OF OVER CURRENT RELAY
Objectives of the experiment	:	Identify different types of over current relays. Identify basic component of IDMT over current relay. Differentiate various characteristics of over current relay. Recognize the way of connecting over current relay in power circuit. Determine the time –current characteristics of over current relay.
Materials Required	:	None
Equipment & Tools	:	Induction type over current relay. Variable 1-ph power supply. Variable resistor. AC ammeter. Stop watch. Connection wires
Conditions	:	None
References	:	Lab Instruction Manual and notes.
Requirements by the student	:	To study the assigned experiment and familiarize himself. Trainee will read the related laboratory hand out. Write observation in his log book
General Instructions	:	Absent will be marked if any student enters in the lab after 5 minutes. Each group have maximum 5 students. On every next lab session, a test may be conducted related to previous work. Report to the tutor if you find equipment that is out of order or you break something, "no blame culture". Prepare the written experiment report according to your tutor instructions Smoking, eating, or drinking of any kind in the lab are prohibited. No unapproved experiments may be performed.

HOD: Prof. Dr. Mohammed Farahat