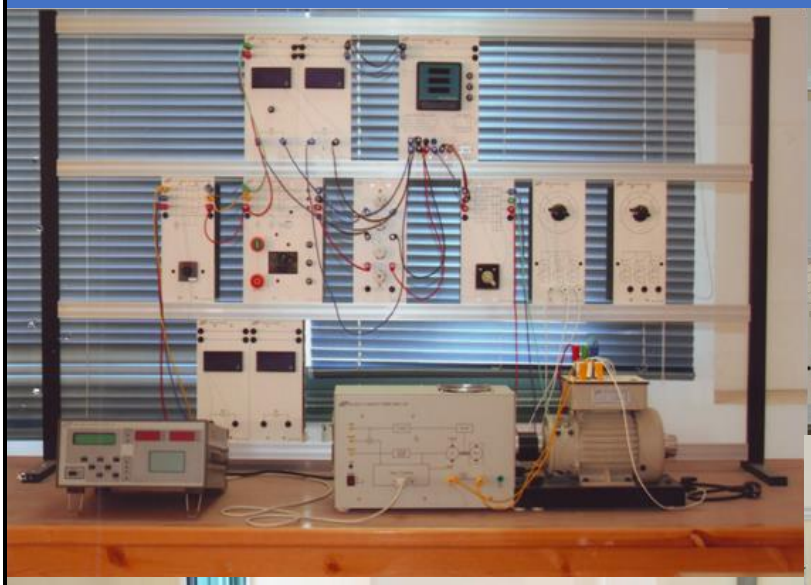
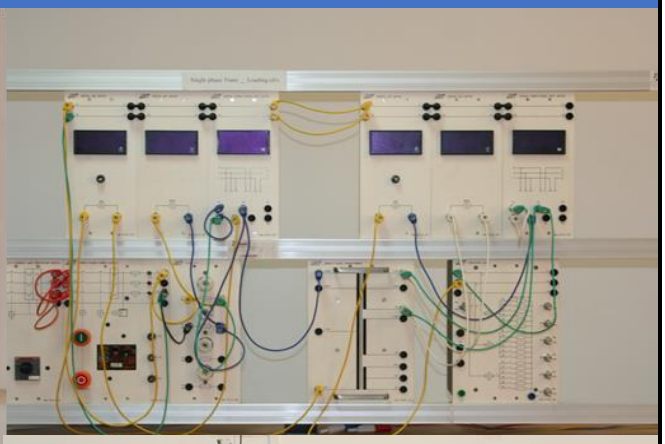
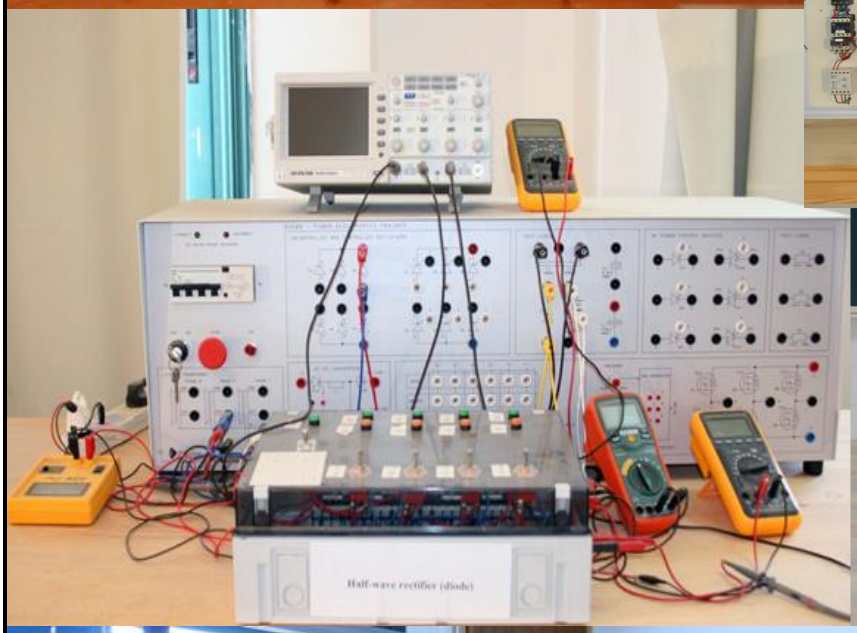
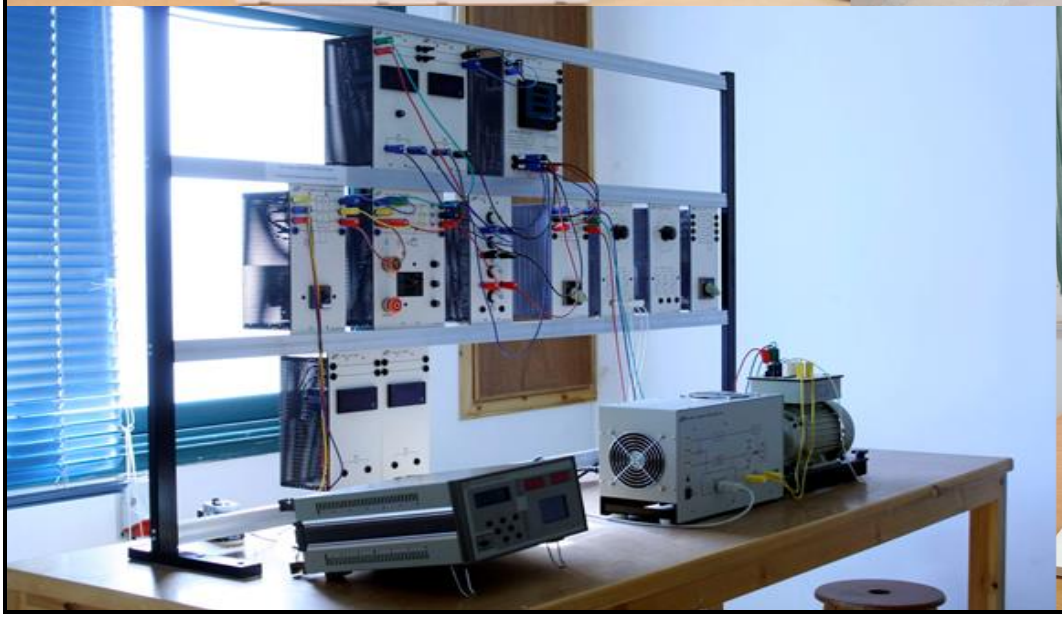
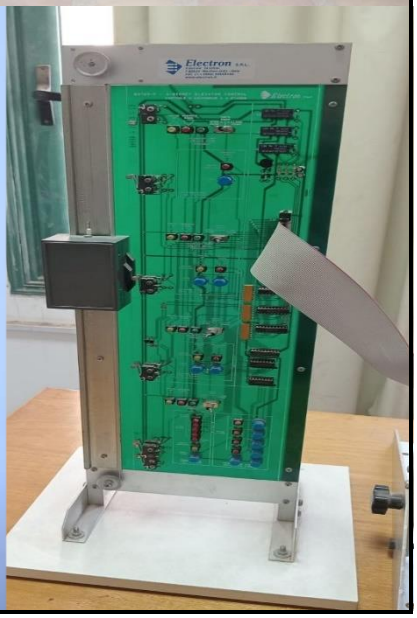
وزارة التعليم العالي
المعهد العالي للهندسة والتكنولوجيا
هندسة القوى الكهربية

المعامل التي تخدم برنامج كهرباء قوى



الفهـــــــــرس

العنوان	الصفحة
1. برنامج هندسة القوى الكهربية.	3
2. دليل المعامل التي تخدم برنامج هندسة القوى الكهربية.	3
3. وسائل تحقيق الأمن والسلامة لبرنامج هندسة القوى الكهربية	5
5. تقرير عن تطوير وتعزيز وصيانة المعامل لقسم القوى الكهربية	5
4. ملائمة المعامل التخصصية لمتطلبات البرنامج. 1- معمل القياسات الإلكترونية 308. 2- معمل الإلكترونيات الرقمية 409. 3- معمل هندسة الكمبيوتر.	13
6. تقرير عن تطوير وتعزيز وصيانة المعامل لقسم القوى الكهربية. 1- معمل آلات كهربية 1&2. 2- معمل آلات كهربية 3. 3- معمل آلات كهربية 4. 4- معمل نظم القوى الكهربية. 5- معمل المحكمات المنطقية والتحكم الالي (PLC). 6- معمل إلكترونيات القوى (1)،(2) (Power Electronics). 7- معمل الجهد العالي (High Voltage).	 43 60 66 77 87 108 123
7. الخاتمة	

1. برنامج هندسة القوى الكهربية

نبذه عن البرنامج

يهدف برنامج هندسة القوى الكهربية إلى اكتساب الطلاب للمهارات المعرفية والذهنية اللازمة للتصميم والتشغيل والتحكم في أنظمة القوى الكهربية والإلكترونية. يشمل البرنامج دراسة مكثفة لمواضيع مثل الآلات الكهربية، إلكترونيات القوى، التحليل والتحكم والحماية لأنظمة القوى الكهربية والجهد العالي.

أهداف البرنامج

- ✓ تطبيق المعرفة بالرياضيات والعلوم ومفاهيم الهندسة لحل المشاكل في مجال الطاقة والآلات.
- ✓ تصميم وإجراء التجارب، فضلاً عن تحليل وتفسير البيانات، للعمل بفعالية ضمن فرق متعددة التخصصات.
- ✓ استخدام التقنيات والأدوات الهندسية المناسبة اللازمة للممارسة الهندسية وإدارة المشاريع.
- ✓ استغلال الأدوار والمعرفة بالمسؤوليات المهنية والأخلاقية والاجتماعية، مع التأكيد على أهمية التعلم المستمر في مسيرتهم المهنية.
- ✓ توفير بيئة برنامج فعالة تشجع على التعلم الذاتي المستمر والتقدم في المسيرة المهنية.
- ✓ التكيف بنجاح لتطبيق وتطوير التقنيات بمهارات في سياقات جديدة لتلبية مطالب المجتمع
- ✓ معالجة قضايا التشغيل والتحكم واحتياجات التخطيط من خلال العمل التصميمي في هندسة الطاقة الكهربائية.

2. دليل المعامل التي تخدم برنامج هندسة القوى الكهربية

يحتوي برنامج هندسة القوى الكهربية على معامل تخصصية وهي كالاتي:

مسلسل	اسم المعمل	مكان المعمل	المساحة
1	معمل قياسات الإلكترونية	308	٣٨م٢
2	معمل الكترونيات رقميه	409	٣٨م٢
3	معمل الحاسب	410	٥٨م٢
4	معمل آلات كهربية (2,1)	407	٥٩م٢
5	معمل الات كهربية (3)	404	٤٠م٢
6	معمل الات كهربية (4)	405	٤٠م٢
7	معمل نظم القوى الكهربية	412	٤٠م٢
8	معمل المحكمات المنطقية والتحكم الالي	402	٨٠م٢
9	معمل إلكترونيات القوى(1)،(2)	411	٤٠م٢
10	معمل الجهد العالي	107	٥٩م٢

المعامل تعمل بكامل طاقتها الاستيعابية لتخدم قسم القوى الكهربية طبقا الجدول الدراسي في الفصل الدراسي الأول والثاني.

ويتم تسجيل القراءة وكل ما يخص التجربة في تقرير المعمل.

Student name		Code No.		Mark
Course name				
Experiment name				
Objective of experiment				
Draw the main structure of experiment?				
What is the benefit of experiment in engineering field?				
Write the Result and any notifications of the experiment.				

3. وسائل تحقيق الأمن و السلامة لبرنامج هندسة القوى الكهربية

المعامل مجهزة أبواب تساعد في خطة الأخلاء (الأبواب تفتح إلى خارج المعمل) ومجهزة بوسائل الاطفاء في وقت الطوارئ ومدعمة بأجهزة استشعار الحريق وبها كاميرات مراقبة لانتظام العملية التعليمية والمعامل كاملة جيدة التهوية وتحتوي على أجهزة تكييف ومناسبة وأيضا توجد لوحة كهرباء تغذية خاصة بكل معمل ويحتوي كل معمل على التجهيزات الخاصة التي تساعد في العملية التعليمية.

يساعد فني المعمل على تأمين المعمل ليخدم العملية التعليمية من خلال التأكد من بعض النقاط التي تجعل المعمل مناسبا لأداء الاختبارات الكهربية وهي كما يلي:

- ✓ التأكد من تجهيز المعمل بوسائل الإضاءة والتهوية الطبيعية والصناعية مع متابعة الصيانة الدورية لتلك التجهيزات.
- ✓ التأكد من تواجد وسائل الاطفاء ووسائل الإنذار للحريق داخل المعمل مع التأكيد على صلاحيتها ومتابعة تنفيذ الصيانة الدورية لتلك المعدات.
- ✓ التأكد من وجود أغطية على نقاط الكهرباء الموجودة داخل المعمل.
- ✓ التأكيد على التخزين الجيد للأدوات والأجهزة المستخدمة داخل المعمل.
- ✓ ممنوع منعا باتا التدخين داخل المعامل.
- ✓ التأكد من سلامة وسائل غلق المياه والغاز والكهرباء في المعمل مه وضعهم في أماكن يسهل الوصول إليها.
- ✓ التأكد من وجود مجموعة الإسعافات الأولية داخل المعمل مع متابعة تنفيذ أعمال الصيانة الدورية لها لتوفير الدعم إلى المصاب تمهيدا لنقله إلى العيادة الطبية.
- ✓ التأكد من تنفيذ خطة الاخلاء في حالة الطوارئ مع التأكيد على التدريب عليها بصفة دورية.
- ✓ يمنع منعا باتا إقامة أي مخازن للمواد البترولية أو المواد القابلة للاشتعال بجوار المعامل.

4.تقرير عن تطوير وتعزيز وصيانة المعامل لقسم القوى الكهربية

<u>التطوير والتعزيز المعامل:</u>

تم شراء مصدر تيار كهربائي مستمر ومقاومات وجهاز قياس لمعمل القياسات الإلكترونية في عام 2023.

الصيانة الدورية:

يتم متابعة الصيانة من خلال نظام يتبع خطوات تضمن العمل في المعامل بكفاءة:

1. **إتباع القواعد الوقائية و الضرورية للمعمل و المتابعة من خلال نموذج (ا) الملصق على باب المعمل من الداخل (Preventive maintenance) لكي يتمكن الطلاب و عضو هيئة التدريس من متابعة العمل بسلاسة في المعمل.**
2. **التعامل مع التجربة أو الأجهزة أو المهمات في المعمل التي تحتاج صيانة من خلال نموذج (ب) (Predictive maintenance) لرصد العطل و متطلبات الأصلاح و تكلفة الأصلاح و الشركة التي قامت بالفحص إن لزم الأمر و عرض السعر و ما تم التعامل عليه بفاتورة و ارفاقه مع نموذج (ب) في ملف المعمل.**

و من خلال نظام الصيانة تم حصر العديد من الأنجازات و مايلي بعض منها:

1. تم صيانة أجهزة التكييف في معمل آلات الكهربية (1و2) ومعمل آلات كهربية (3) ومعمل آلات كهربية (4) ومعمل إلكترونيات القوى ومعمل القياسات الالكترونية
1. تم ضبط مواسير دكت كهرباء في معمل القياسات الإلكترونية.
2. تم ضبط باب معمل المحكمات المنطقية ومعمل إلكترونيات القوى.
3. تم استكمال أعمال النقاشة في معمل القياسات الإلكترونية ومعمل آلات الكهربية (1و2) ومعمل آلات كهربية (3) ومعمل آلات كهربية (4) ومعمل المحكمات المنطقية.

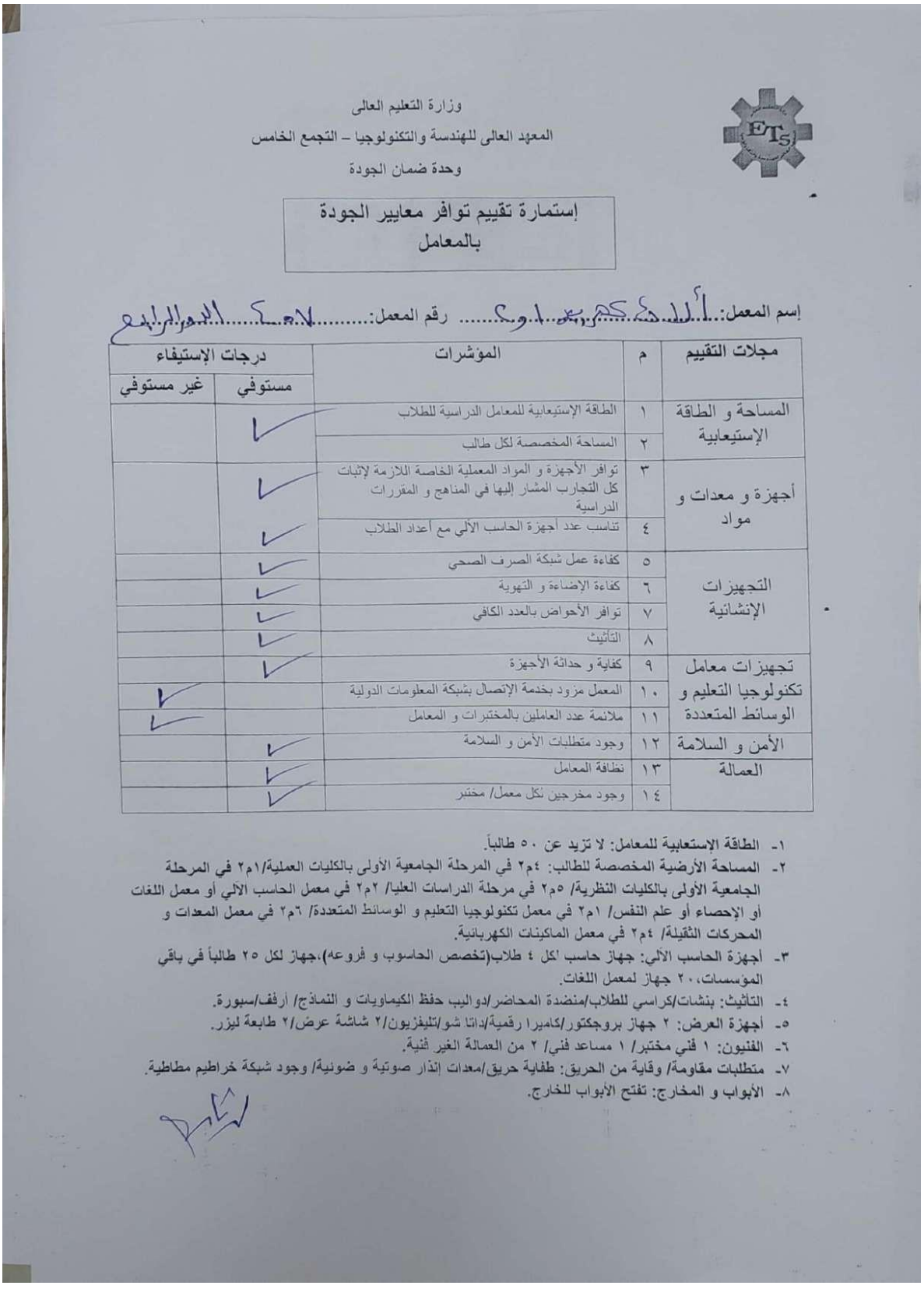
وزارة التعليم العالى
المعهد العالى للهندسة والتكنولوجيا – التجمع الخامس
وحدة ضمان الجودة

إستمارة تقييم توافر معايير الجودة بالمعامل

إسم المعمل: المعهد العالي ..... رقم المعمل: ١٠٧ المعمل الدوائي

مجلات التقييم	م	المؤشرات	درجات الإستيفاء	
			مستوفي	غير مستوفي
المساحة و الطاقة الإستيعابية	١	الطاقة الإستيعابية للمعامل الدراسية للطلاب	✓	
	٢	المساحة المخصصة لكل طالب		
أجهزة و معدات و مواد	٣	توافر الأجهزة و المواد المعملية الخاصة اللازمة لإثبات كل التجارب المشار إليها في المناهج و المقررات الدراسية	✓	
	٤	تناسب عدد أجهزة الحاسب الآلي مع أعداد الطلاب		
التجهيزات الإنشائية	٥	كفاءة عمل شبكة الصرف الصحي	✓	
	٦	كفاءة الإضاءة و التهوية	✓	
	٧	توافر الأحواض بالعدد الكافي	✓	
	٨	التأثيث	✓	
تجهيزات معامل تكنولوجيا التعليم و الوسائط المتعددة	٩	كفاية و حداثة الأجهزة	✓	
	١٠	المعمل مزود بخدمة الإتصال بشبكة المعلومات الدولية		✓
	١١	ملائمة عدد العاملين بالمختبرات و المعامل	✓	
الأمن و السلامة	١٢	وجود متطلبات الأمن و السلامة	✓	
العمالة	١٣	نظافة المعامل	✓	
	١٤	وجود مخرجين لكل معمل/ مختبر	✓	

١- الطاقة الإستعابية للمعامل: لا تزيد عن ٥٠ طالباً.
٢- المساحة الأرضية المخصصة للطالب: ٤م٢ في المرحلة الجامعية الأولى بالكليات العملية/١م٢ في المرحلة الجامعية الأولى بالكليات النظرية/ ٥م٢ في مرحلة الدراسات العليا/ ٢م٢ في معمل الحاسب الآلي أو معمل اللغات أو الإحصاء أو علم النفس/ ١م٢ في معمل تكنولوجيا التعليم و الوسائط المتعددة/ ٦م٢ في معمل المعدات و المحركات الثقيلة/ ٤م٢ في معمل الماكينات الكهربائية.
٣- أجهزة الحاسب الآلي: جهاز حاسب لكل ٤ طلاب(تخصص الحاسوب و فروعه)،جهاز لكل ٢٥ طالباً في باقي المؤسسات، ٢٠ جهاز لمعمل اللغات.
٤- التأثيث: بنشات/كراسي للطلاب/منضدة المحاضر/دواليب حفظ الكيماويات و النماذج/ أرفف/سبورة.
٥- أجهزة العرض: ٢ جهاز بروجكتور/كاميرا رقمية/داتا شو/تليفزيون/٢ شاشة عرض/٢ طابعة ليزر.
٦- الفنيون: ١ فني مختبر/ ١ مساعد فني/ ٢ من العمالة الغير فنية.
٧- متطلبات مقاومة/ وقاية من الحريق: طفاية حريق/معدات إنذار صوتية و ضوئية/ وجود شبكة خراطيم مطاطية.
٨- الأبواب و المخارج: تفتح الأبواب للخارج.



وزارة التعليم العالى
المعهد العالى للهندسة والتكنولوجيا – التجمع الخامس
وحدة ضمان الجودة

إستمارة تقييم توافر معايير الجودة بالمعامل

إسم المعمل: أبحاث كهربية ..... رقم المعمل: ..... الدور الرابع

مجلات التقييم	م	المؤشرات	درجات الإستيفاء: مستوفي	درجات الإستيفاء: غير مستوفي
المساحة و الطاقة الإستيعابية	١	الطاقة الإستيعابية للمعامل الدراسية للطلاب	✓	
	٢	المساحة المخصصة لكل طالب		
أجهزة و معدات و مواد	٣	توافر الأجهزة و المواد المعملية الخاصة اللازمة لإثبات كل التجارب المشار إليها في المناهج و المقررات الدراسية	✓	
	٤	تناسب عدد أجهزة الحاسب الآلي مع أعداد الطلاب	✓	
التجهيزات الإنشائية	٥	كفاءة عمل شبكة الصرف الصحي	✓	
	٦	كفاءة الإضاءة و التهوية	✓	
	٧	توافر الأحواض بالعدد الكافي	✓	
	٨	التأثيث	✓	
تجهيزات معامل تكنولوجيا التعليم و الوسائط المتعددة	٩	كفاية و حداثة الأجهزة	✓	
	١٠	المعمل مزود بخدمة الإتصال بشبكة المعلومات الدولية		✓
	١١	ملائمة عدد العاملين بالمختبرات و المعامل		✓
الأمن و السلامة	١٢	وجود متطلبات الأمن و السلامة	✓	
العمالة	١٣	نظافة المعامل	✓	
	١٤	وجود مخرجين لكل معمل/ مختبر	✓	

١- الطاقة الإستعابية للمعامل: لا تزيد عن ٥٠ طالباً.
٢- المساحة الأرضية المخصصة للطالب: ٤م٢ في المرحلة الجامعية الأولى بالكليات العملية/١م٢ في المرحلة الجامعية الأولى بالكليات النظرية/ ٥م٢ في مرحلة الدراسات العليا/ ٢م٢ في معمل الحاسب الآلي أو معمل اللغات أو الإحصاء أو علم النفس/ ١م٢ في معمل تكنولوجيا التعليم و الوسائط المتعددة/ ٦م٢ في معمل المعدات و المحركات الثقيلة/ ٤م٢ في معمل الماكينات الكهربائية.
٣- أجهزة الحاسب الآلي: جهاز حاسب لكل ٤ طلاب(تخصص الحاسوب و فروعه)،جهاز لكل ٢٥ طالباً في باقي المؤسسات،٢٠ جهاز لمعمل اللغات.
٤- التأثيث: بنشات/كراسي للطلاب/منضدة المحاضر/دواليب حفظ الكيماويات و النماذج/ أرفف/سبورة.
٥- أجهزة العرض: ٢ جهاز بروجكتور/كاميرا رقمية/داتا شو/تليفزيون/٢ شاشة عرض/٢ طابعة ليزر.
٦- الفنيون: ١ فني مختبر/ ١ مساعد فني/ ٢ من العمالة الغير فنية.
٧- متطلبات مقاومة/ وقاية من الحريق: طفاية حريق/معدات إنذار صوتية و ضوئية/ وجود شبكة خراطيم مطاطية.
٨- الأبواب و المخارج: تفتح الأبواب للخارج.

وزارة التعليم العالى

المعهد العالى للهندسة والتكنولوجيا – التجمع الخامس

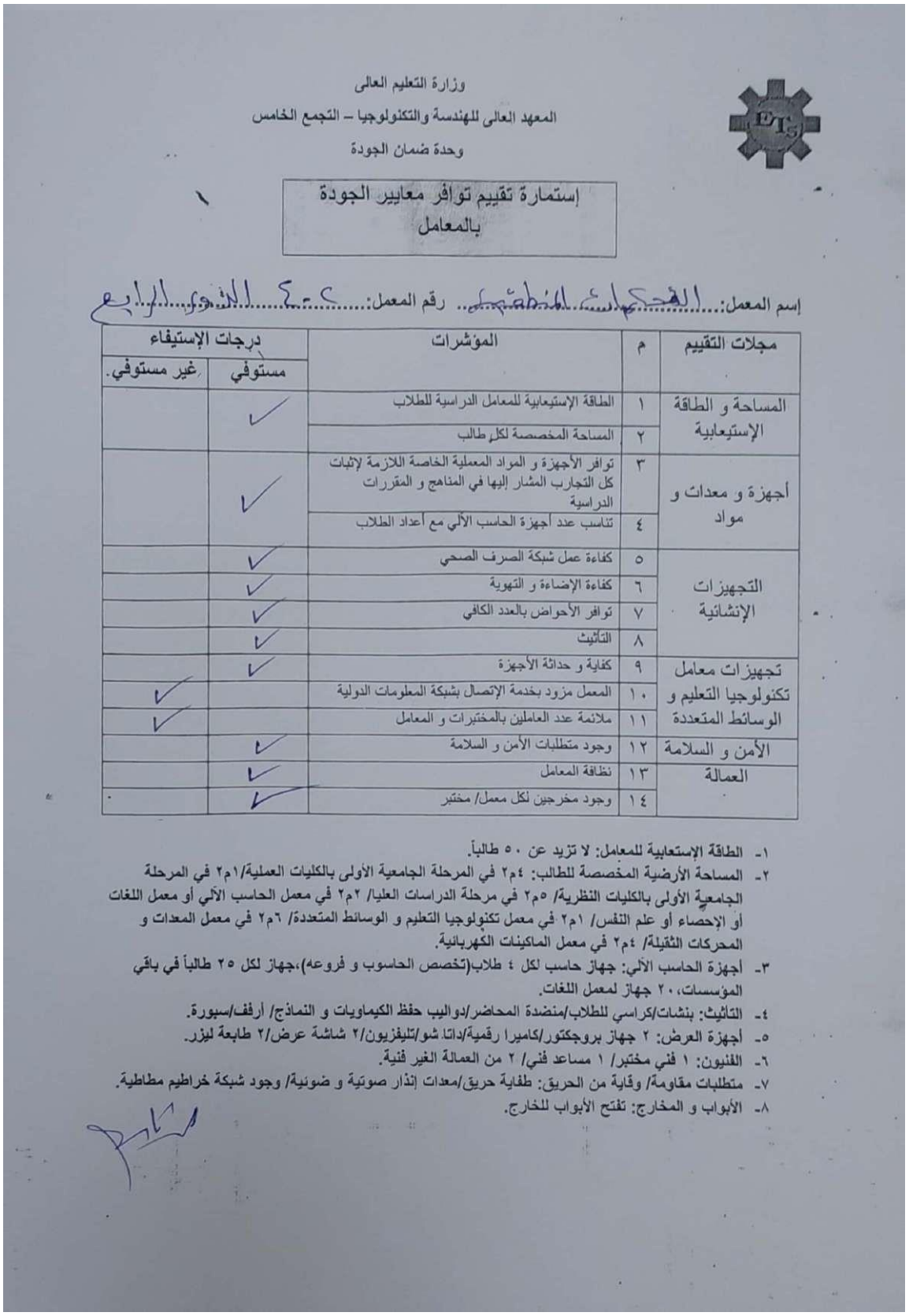
وحدة ضمان الجودة

إستمارة تقييم توافر معايير الجودة بالمعامل

إسم المعمل: أبحاث كهرباء (٤) ..... رقم المعمل: ٤٠٤ الدور الرابع

مجلات التقييم	م	المؤشرات	درجات الإستيفاء: مستوفي	درجات الإستيفاء: غير مستوفي
المساحة و الطاقة الإستيعابية	١	الطاقة الإستيعابية للمعامل الدراسية للطلاب	✓	
	٢	المساحة المخصصة لكل طالب		
أجهزة و معدات و مواد	٣	توافر الأجهزة و المواد المعملية الخاصة اللازمة لإثبات كل التجارب المشار إليها في المناهج و المقررات الدراسية	✓	
	٤	تناسب عدد أجهزة الحاسب الآلي مع أعداد الطلاب		
التجهيزات الإنشائية	٥	كفاءة عمل شبكة الصرف الصحي	✓	
	٦	كفاءة الإضاءة و التهوية	✓	
	٧	توافر الأحواض بالعدد الكافي	✓	
	٨	التأثيث	✓	
تجهيزات معامل تكنولوجيا التعليم و الوسائط المتعددة	٩	كفاية و حداثة الأجهزة	✓	
	١٠	المعمل مزود بخدمة الإتصال بشبكة المعلومات الدولية		✓
	١١	ملائمة عدد العاملين بالمختبرات و المعامل		✓
الأمن و السلامة	١٢	وجود متطلبات الأمن و السلامة	✓	
العمالة	١٣	نظافة المعامل	✓	
	١٤	وجود مخرجين لكل معمل/ مختبر		✓

١- الطاقة الإستعابية للمعامل: لا تزيد عن ٥٠ طالباً.
٢- المساحة الأرضية المخصصة للطالب: ٤م٢ في المرحلة الجامعية الأولى بالكليات العملية/١م٢ في المرحلة الجامعية الأولى بالكليات النظرية/ ٥م٢ في مرحلة الدراسات العليا/ ٢م٢ في معمل الحاسب الآلي أو معمل اللغات أو الإحصاء أو علم النفس/ ١م٢ في معمل تكنولوجيا التعليم و الوسائط المتعددة/ ٦م٢ في معمل المعدات و المحركات الثقيلة/ ٤م٢ في معمل الماكينات الكهربائية.
٣- أجهزة الحاسب الآلي: جهاز حاسب لكل ٤ طلاب(تخصص الحاسوب و فروعه)،جهاز لكل ٢٥ طالباً في باقي المؤسسات، ٢٠ جهاز لمعمل اللغات.
٤- التأثيث: بنشات/كراسي للطلاب/منضدة المحاضر/دواليب حفظ الكيماويات و النماذج/ أرفف/سبورة.
٥- أجهزة العرض: ٢ جهاز بروجكتور/كاميرا رقمية/داتا شو/تليفزيون/٢ شاشة عرض/٢ طابعة ليزر.
٦- الفنيون: ١ فني مختبر/ ١ مساعد فني/ ٢ من العمالة الغير فنية.
٧- متطلبات مقاومة/ وقاية من الحريق: طفاية حريق/معدات إنذار صوتية و ضوئية/ وجود شبكة خراطيم مطاطية.
٨- الأبواب و المخارج: تفتح الأبواب للخارج.



وزارة التعليم العالى

المعهد العالى للهندسة والتكنولوجيا – التجمع الخامس

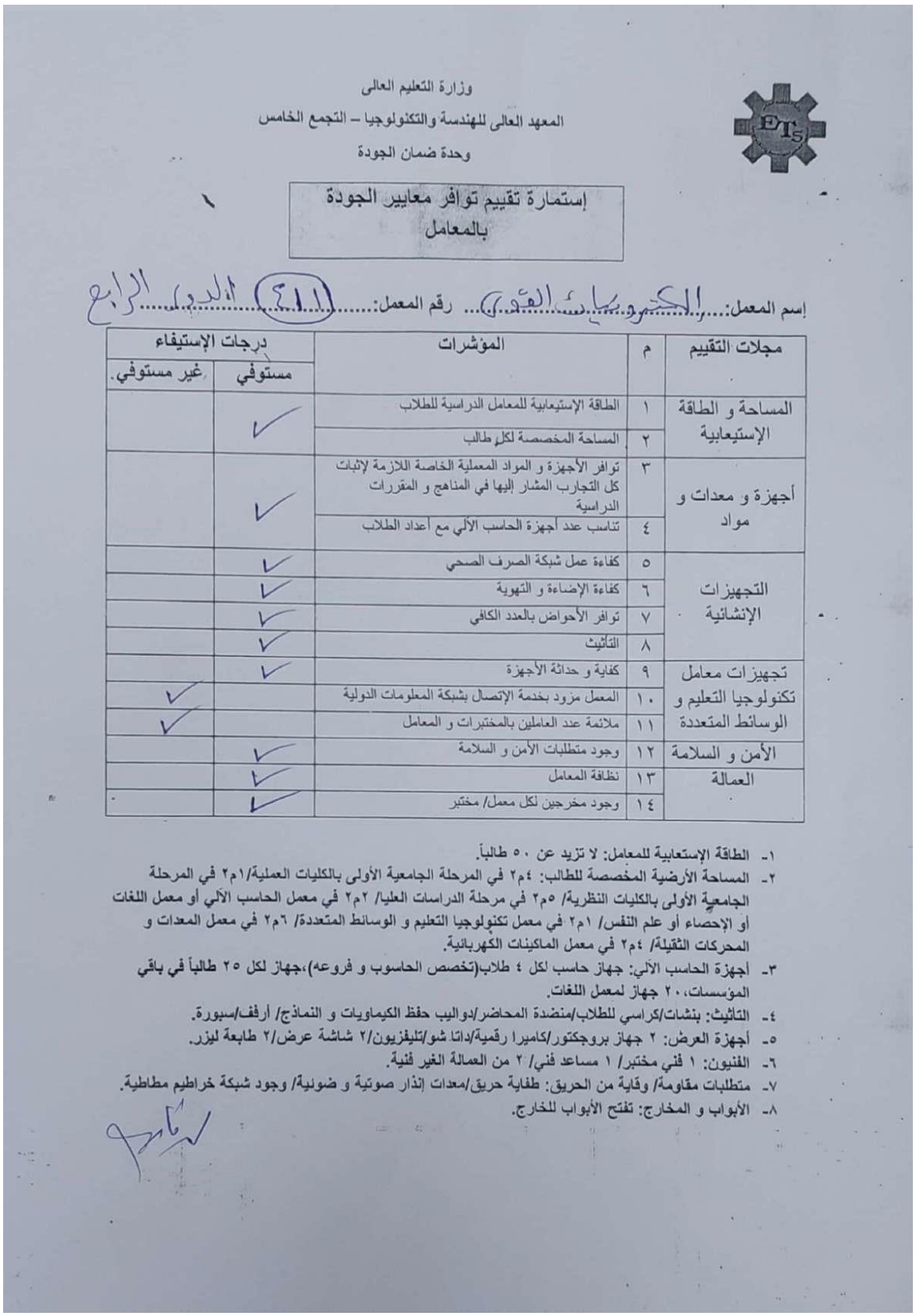
وحدة ضمان الجودة

إستمارة تقييم توافر معايير الجودة بالمعامل

إسم المعمل: الهيدروليكا والنظم ... رقم المعمل: ٤٠٢ الدور الرابع

مجلات التقييم	م	المؤشرات	درجات الإستيفاء: مستوفي	درجات الإستيفاء: غير مستوفي.
المساحة و الطاقة الإستيعابية	١	الطاقة الإستيعابية للمعامل الدراسية للطلاب	✓	
	٢	المساحة المخصصة لكل طالب		
أجهزة و معدات و مواد	٣	توافر الأجهزة و المواد المعملية الخاصة اللازمة لإثبات كل التجارب المشار إليها في المناهج و المقررات الدراسية	✓	
	٤	تناسب عدد أجهزة الحاسب الآلي مع أعداد الطلاب		
التجهيزات الإنشائية	٥	كفاءة عمل شبكة الصرف الصحي	✓	
	٦	كفاءة الإضاءة و التهوية	✓	
	٧	توافر الأحواض بالعدد الكافي	✓	
	٨	التأثيث	✓	
تجهيزات معامل تكنولوجيا التعليم و الوسائط المتعددة	٩	كفاية و حداثة الأجهزة	✓	
	١٠	المعمل مزود بخدمة الإتصال بشبكة المعلومات الدولية		✓
	١١	ملائمة عدد العاملين بالمختبرات و المعامل		✓
الأمن و السلامة	١٢	وجود متطلبات الأمن و السلامة	✓	
العمالة	١٣	نظافة المعامل	✓	
	١٤	وجود مخرجين لكل معمل/ مختبر	✓	

١- الطاقة الإستعابية للمعامل: لا تزيد عن ٥٠ طالباً.
٢- المساحة الأرضية المخصصة للطالب: ٤م٢ في المرحلة الجامعية الأولى بالكليات العملية/١م٢ في المرحلة الجامعية الأولى بالكليات النظرية/ ٥م٢ في مرحلة الدراسات العليا/ ٢م٢ في معمل الحاسب الآلي أو معمل اللغات أو الإحصاء أو علم النفس/ ١م٢ في معمل تكنولوجيا التعليم و الوسائط المتعددة/ ٦م٢ في معمل المعدات و المحركات الثقيلة/ ٤م٢ في معمل الماكينات الكهربائية.
٣- أجهزة الحاسب الآلي: جهاز حاسب لكل ٤ طلاب(تخصص الحاسوب و فروعه)،جهاز لكل ٢٥ طالباً في باقي المؤسسات، ٢٠ جهاز لمعمل اللغات.
٤- التأثيث: بنشات/كراسي للطلاب/منضدة المحاضر/دواليب حفظ الكيماويات و النماذج/ أرفف/سبورة.
٥- أجهزة العرض: ٢ جهاز بروجكتور/كاميرا رقمية/داتا شو/تليفزيون/٢ شاشة عرض/٢ طابعة ليزر.
٦- الفنيون: ١ فني مختبر/ ١ مساعد فني/ ٢ من العمالة الغير فنية.
٧- متطلبات مقاومة/ وقاية من الحريق: طفاية حريق/معدات إنذار صوتية و ضوئية/ وجود شبكة خراطيم مطاطية.
٨- الأبواب و المخارج: تفتح الأبواب للخارج.



وزارة التعليم العالى
المعهد العالى للهندسة والتكنولوجيا – التجمع الخامس
وحدة ضمان الجودة

إستمارة تقييم توافر معايير الجودة بالمعامل

إسم المعمل: الكهروميكانيكا القوى ... رقم المعمل: (٤١١) الدور الرابع

مجلات التقييم	م	المؤشرات	درجات الإستيفاء: مستوفي	درجات الإستيفاء: غير مستوفي
المساحة و الطاقة الإستيعابية	١	الطاقة الإستيعابية للمعامل الدراسية للطلاب	✓	
	٢	المساحة المخصصة لكل طالب		
أجهزة و معدات و مواد	٣	توافر الأجهزة و المواد المعملية الخاصة اللازمة لإثبات كل التجارب المشار إليها في المناهج و المقررات الدراسية	✓	
	٤	تناسب عدد أجهزة الحاسب الآلي مع أعداد الطلاب		
التجهيزات الإنشائية	٥	كفاءة عمل شبكة الصرف الصحي	✓	
	٦	كفاءة الإضاءة و التهوية	✓	
	٧	توافر الأحواض بالعدد الكافي	✓	
	٨	التأثيث	✓	
تجهيزات معامل تكنولوجيا التعليم و الوسائط المتعددة	٩	كفاية و حداثة الأجهزة	✓	
	١٠	المعمل مزود بخدمة الإتصال بشبكة المعلومات الدولية		✓
	١١	ملائمة عدد العاملين بالمختبرات و المعامل		✓
الأمن و السلامة	١٢	وجود متطلبات الأمن و السلامة	✓	
العمالة	١٣	نظافة المعامل	✓	
	١٤	وجود مخرجين لكل معمل/ مختبر	✓	

١- الطاقة الإستعابية للمعامل: لا تزيد عن ٥٠ طالباً.
٢- المساحة الأرضية المخصصة للطالب: ٤م٢ في المرحلة الجامعية الأولى بالكليات العملية/١م٢ في المرحلة الجامعية الأولى بالكليات النظرية/ ٥م٢ في مرحلة الدراسات العليا/ ٢م٢ في معمل الحاسب الآلي أو معمل اللغات أو الإحصاء أو علم النفس/ ١م٢ في معمل تكنولوجيا التعليم و الوسائط المتعددة/ ٦م٢ في معمل المعدات و المحركات الثقيلة/ ٤م٢ في معمل الماكينات الكهربائية.
٣- أجهزة الحاسب الآلي: جهاز حاسب لكل ٤ طلاب(تخصص الحاسوب و فروعه)،جهاز لكل ٢٥ طالباً في باقي المؤسسات، ٢٠ جهاز لمعمل اللغات.
٤- التأثيث: بنشات/كراسي للطلاب/منضدة المحاضر/دواليب حفظ الكيماويات و النماذج/ أرفف/سبورة.
٥- أجهزة العرض: ٢ جهاز بروجكتور/كاميرا رقمية/داتا شو/تليفزيون/٢ شاشة عرض/٢ طابعة ليزر.
٦- الفنيون: ١ فني مختبر/ ١ مساعد فني/ ٢ من العمالة الغير فنية.
٧- متطلبات مقاومة/ وقاية من الحريق: طفاية حريق/معدات إنذار صوتية و ضوئية/ وجود شبكة خراطيم مطاطية.
٨- الأبواب و المخارج: تفتح الأبواب للخارج.

وزارة التعليم العالى
المعهد العالى للهندسة والتكنولوجيا – التجمع الخامس
وحدة ضمان الجودة

إستمارة تقييم توافر معايير الجودة بالمعامل

إسم المعمل: أبحاث كهرباء (٣) رقم المعمل: ٥٠٤ الدور الرابع

مجلات التقييم	م	المؤشرات	درجات الإستيفاء: مستوفي	درجات الإستيفاء: غير مستوفي
المساحة و الطاقة الإستيعابية	١	الطاقة الإستيعابية للمعامل الدراسية للطلاب	✓	
	٢	المساحة المخصصة لكل طالب		
أجهزة و معدات و مواد	٣	توافر الأجهزة و المواد المعملية الخاصة اللازمة لإثبات كل التجارب المشار إليها في المناهج و المقررات الدراسية	✓	
	٤	تناسب عدد أجهزة الحاسب الآلي مع أعداد الطلاب	✓	
التجهيزات الإنشائية	٥	كفاءة عمل شبكة الصرف الصحي	✓	
	٦	كفاءة الإضاءة و التهوية	✓	
	٧	توافر الأحواض بالعدد الكافي	✓	
	٨	التأثيث	✓	
تجهيزات معامل تكنولوجيا التعليم و الوسائط المتعددة	٩	كفاية و حداثة الأجهزة	✓	
	١٠	المعمل مزود بخدمة الإتصال بشبكة المعلومات الدولية		✓
	١١	ملائمة عدد العاملين بالمختبرات و المعامل		✓
الأمن و السلامة	١٢	وجود متطلبات الأمن و السلامة	✓	
العمالة	١٣	نظافة المعامل	✓	
	١٤	وجود مخرجين لكل معمل/ مختبر		✓

١- الطاقة الإستعابية للمعامل: لا تزيد عن ٥٠ طالباً.
٢- المساحة الأرضية المخصصة للطالب: ٤م٢ في المرحلة الجامعية الأولى بالكليات العملية/١م٢ في المرحلة الجامعية الأولى بالكليات النظرية/ ٥م٢ في مرحلة الدراسات العليا/ ٢م٢ في معمل الحاسب الآلي أو معمل اللغات أو الإحصاء أو علم النفس/ ١م٢ في معمل تكنولوجيا التعليم و الوسائط المتعددة/ ٦م٢ في معمل المعدات و المحركات الثقيلة/ ٤م٢ في معمل الماكينات الكهربائية.
٣- أجهزة الحاسب الآلي: جهاز حاسب لكل ٤ طلاب(تخصص الحاسوب و فروعه)،جهاز لكل ٢٥ طالباً في باقي المؤسسات، ٢٠ جهاز لمعمل اللغات.
٤- التأثيث: بنشات/كراسي للطلاب/منضدة المحاضر/دواليب حفظ الكيماويات و النماذج/ أرفف/سبورة.
٥- أجهزة العرض: ٢ جهاز بروجكتور/كاميرا رقمية/داتا شو/تليفزيون/٢ شاشة عرض/٢ طابعة ليزر.
٦- الفنيون: ١ فني مختبر/ ١ مساعد فني/ ٢ من العمالة الغير فنية.
٧- متطلبات مقاومة/ وقاية من الحريق: طفاية حريق/معدات إنذار صوتية و ضوئية/ وجود شبكة خراطيم مطاطية.
٨- الأبواب و المخارج: تفتح الأبواب للخارج.

5. ملائمة المعامل التخصصية لمتطلبات برنامج هندسة القوى الكهربية

توضح الجداول التالية ارتباط المعمل بالمقررات الدراسية والتي تخدم شعبة الكهرباء العامة والتخصصية لبرنامج هندسة القوى الكهربية.

5. 1 معمل القياسات الإلكترونية 308

❖ **اسم المقررات التى يخدمها المعمل**

- هندسه الكترونية.
- دوائر الكترونية (1).
- دوائر كهربية (1).
- اتصالات (1).
- مجالات مغناطيسية.
- تحويل طاقة.
- هوائيات.
- تموجات كهرومغناطيسية.
- اختبارات كهربيه (2).

❖ **قائمة بالتجارب الموجودة بالمعمل**

1. **Basic Electricity Experiments.**
2. **Magnetism.**
3. **Basic Electronic Circuit.**
4. **Simple Electronic Circuit.**
5. **Industrial control application.**
6. **Oscillator Experiments and Applications.**
7. **AF Generator and Frequency Counter (built-in).**
8. **Dual DC Power Supply (5/6V, 9/12/15V).**
9. **Decade Capacitor (2 digits) and Programmable Resistor.**

2 .5 معمل الإلكترونيات الرقمية 408

❖ **اسم المقررات التى يخدمها المعمل**

- دوائر منطقية.
- دوائر الكترونية (1).
- تنظيم حاسبات (1).
- دوائر رقمية.
- دوائر متكاملة.
- نظم اتصالات (2).
- اختبارات كهربية (2).

❖ **قائمة بالتجارب الموجودة بالمعمل**

1. Basic Logic Gates Experiments

2. Combinational Logic Circuits Experiments

- **NOR gate Circuits**
- **NAND gate Circuits**
- **XOR gate circuit**
- **AND-OR-INVERT (AOI) gate circuit**
- **Comparator circuits**
- **Schmitt gate circuit**
- **Open-collector gate circuits**
- **Tristate gate circuits**
- **Half-adder and full-adder circuits**
- **Half-subtractor and full-subtractor circuit**
- **Arithmetic Logic Unit (ALU) circuit**
- **Bit parity generator circuit**
- **Encoder circuit**

- **Decoder circuit**
- **Multiplexer circuit**
- **Demultiplexer circuit**
- **Digitally controlled analog multiplexer/demultiplexer**

3. Clock Generator Circuit Experiments
4. Sequential Logic Circuit Experiments Flip-flop circuits
5. Memory Circuit Experiments

- **Constructing Read Only Memory (ROM)**
- **Constructing Random Access Memory (RAM)**
- **64-bit RAM**
- **Erasable Programmable Read Only Memory**
- **Electronic EPROM (EEPROM) circuit**
- **Constructing dynamic scanning counter with single-chip Microprocessor**

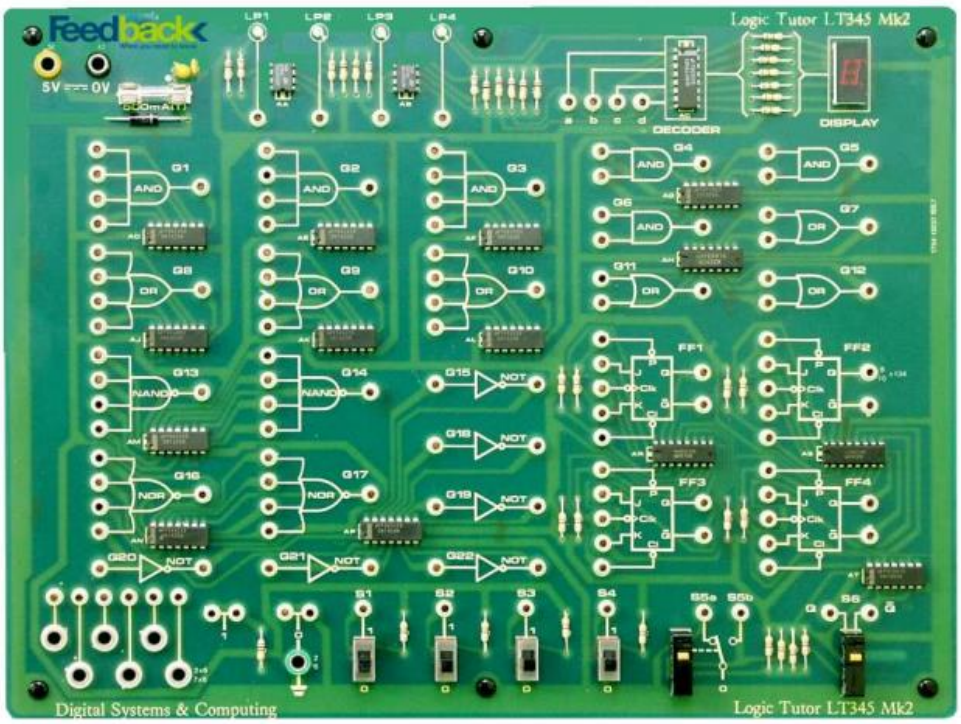
6. Converter Circuit

- **Digital/Analog Converter (DAC) circuit**
- **Analog/Digital Converter (ADC) circuit**

Feedback

Engineering Teaching Solutions

Logic Tutor LT345



Description

The Logic Tutor LT345 Mk2 is ideal for introducing logic tuition into a syllabus on a small budget. It is a compact and easy-to-use board for studies of digital techniques and principles. It is supplied with a comprehensive teaching manual which takes the student from the simplest logic operations, up to the applications of counters, shift registers and numeric displays. For ease of interconnection and understanding, all necessary inputs and logic indicators are built-in and all logic elements are shown in mimic diagram form on the panel. Unlike many other logic tutors, there are no confusing cross references to integrated circuit data sheets. The integrated circuits are permanently fitted, which avoids the potential student damage and contact problems normally associated with the ,breadboard type of tutor employing loose ICs and sockets. The Logic Tutor is robust and fully protected electrically and mechanically against the most common forms of maltreatment. All the workboards in our Electricity and Electronics range use an open printed circuit board construction and can be conveniently housed in the dedicated Systems Storage Rack SSR1000.

Features

- Wide range of combinational and sequential logic studies
- All inputs and displays provided
- Complete with comprehensive instruction manuals
- Reliable and robust
- Economically priced

Feedback

Engineering Teaching Solutions

Logic complement	3 x 4-input AND, 3 x 4-input OR, 3 x 2-input AND, 3 x 2-input OR, 2 x 4-input NAND, 2 x 4-input NOR, 6 x inverters, 4x JK flip-flops with edge-clocking and d.c. preset and clear.
Inputs	4 x Binary slide switches, 1 x unlatched change-over push-button, 1 x Latched push-button.
Outputs	4 x LED logic state indicators, 1 x 7-segment numeric display with binary-to-decimal decoder.
Logic levels	TTL, 0V and +5 V nominal.
Construction	Single-sided PWB with logic symbols silk-screened on component side, mounted in plastic protective box.
Interconnections	By stackable 2 mm leads and sockets. Six 2 mm-to-4 mm transfer points are provided for connection to external equipment e.g oscilloscopes, meters, generators, etc. Number of leads supplied - 40 x 2 mm as follows: 15 x 100 mm (4 in), 15 x 150 mm (6 in), 10 x 300 mm (12 in). 2 x 4 mm: 560 mm (22 in).
Manual Supplied	**Logic Tutor LT345** Thirteen Assignments as follows: Binary numbers; Basic Logical Operations; Combinational Logic; Karnaugh Maps; The simple latch and clocked flip-flops; The JK flip-flop; Equivalence, Non-equivalence and other circuits; Binary addition; Registers; Synchronous Counters; Asynchronous Counters; Codes and Code Converters; 7-segment Display.
Power requirements	Requires 0 V and +5 V at 500 mA maximum. Feedback dc Power Supply, 01-100 is recommended. A 500 mA fuse protects against short circuits on the board. The circuits are protected against accidental reverse or over-voltage connection.
Storage	Supplied in a box containing the LT345 Mk2, leads and manual.
Dimensions & Weight	**Width:** 295 mm (11.6 in) **Depth:** 220 mm (8.7 in) **Height:** 45 mm (1.75 in) **Weight:** 0.25 kg (0.55 lb).
Tender Specification	TTL Logic Tutor to teach combinational and sequential digital circuits and numeric displays. To provide mimic diagram of all elements. To be powered from an external +5 V supply. Complete with teaching manual containing thirteen assignments. If no laboratory power unit is available, a suitable unit can be supplied by Feedback.
Ordering Information	Logic Tutor (supplied without Power Supply, use 01-100) LT345 Mk2 d.c. Power Supply 01-100 System Storage Rack SSR1000

Feedback

Feedback Instruments
5 & 6 Warren Court
Park Road, Crowborough
East Sussex; TN6 2QX
United Kingdom
Tel: +44 1892 653322
Sales: sales@feedback-instruments.com
Website: www.feedback-instruments.com

For further information on Feedback equipment please contact ...

Electronics Circuits Equipment

KL-300
Digital Logic Lab

The KL-300 Digital Logic Lab is a comprehensive and self-contained system suitable for anyone engaged in digital logic experiments.

All the necessary equipment for digital logic experiments such as power supply, signal generator, switches and displays are installed on the main unit.

The 13 modules cover a large variety of essential topics for digital logic. It is a time and cost saver for both students and engineers interested in developing and testing circuit prototypes.

+ Simulation

● Features

1. Suitable for combination logic, sequential logic and microprocessor circuits design and experiments.
2. Ideal tool for learning the basics of digital logic circuits.
3. Comprehensive power, signal supply and testing devices for convenient experiments.
4. Experiments are expandible and flexible with universal breadboard.
5. Capable of processing TTL, CMOS, NMOS, PMOS and ECL circuits.
6. All supply units are equipped with overload protection for safety purpose.
7. All modules equipped with 8-bit DIP switch for fault simulations.
8. Individual storage cases for all modules to be easy kept and carried.
9. All signal generators have independent and simultaneous TTL and CMOS level output terminal.
10. Including computer - based training

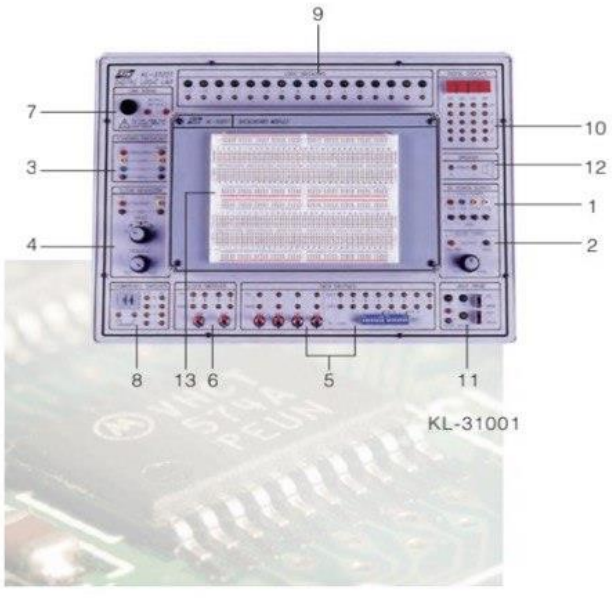
● Specifications

Main Unit (KL-31001)

1. Dual DC Power Supply
   (1) Voltage range : +5V/1.5A, -5V/0.3A, ±12V/0.3A
   (2) With output overload protection
2. Adjustable DC Power Supply
   (1) Voltage range : +1.5V~+15V
   (2) Maximum current output : 0.5A
   (3) With output overload protection
3. Standard Frequency
   (1) Frequency : 1MHz, 60Hz, 1Hz
   (2) Accuracy : ±0.01% (1MHz)
   (3) Fan out : 10 TTL load
4. Clock Signal Generator
   (1) Frequency : 1Hz ~ 1MHz (6 ranges)
   a. 1Hz ~ 10Hz
   b. 10Hz ~ 100Hz
   c. 100Hz ~ 1KHz
   d. 1KHz ~ 10KHz
   e. 10KHz ~ 100KHz
   f. 100KHz ~ 1MHz
   (2) Fan out : 10 TTL load
5. Data Switch
   (1) 8-bit DIP switch x 2, 16-bit TTL level output
   (2) Toggle switch x 4, each with Debounce circuit
   (3) Fan out : 10 TTL load

KL-300

6. Pulser Switch
   (1) 2 sets of independent control output
   (2) Each set with Q, $\overline{Q}$ output, pulse width > 5ms
   (3) Each set of switch with Debounce circuit
   (4) Fan out : 10 TTL load
7. Line Signal Generator
   (1) Frequency : 50Hz/60Hz
   (2) Output voltage : 6Vrms
   (3) With overload protection
8. Thumbwheel Switch
   2-digit, BCD code output and common point input
9. Logic Indicator
   (1) 16 sets of independent LED indicates high and low logic state
   (2) Input Impedance : ≥100KΩ
10. Digital Displays
    (1) 4 sets of independent 7-segment LED display
    (2) With BCD, 7-segment decoder/driver and DP input
    (3) Input with 8-4-2-1 code
11. Logic Probe
    (1) TTL and CMOS level
    (2) 5mm LED displays
    (3) "Lo" and "Hi" LED display low/high logic state respectively
12. Speaker
    One 8Ω, 0.25W speaker with driver circuit
13. Breadboard Modules (AC-90001)
    1680 tie-point breadboard on top panel can be easily put into and taken off.

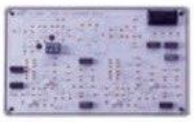


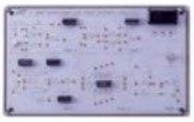
KL-31001

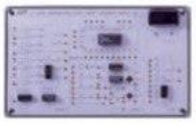
Experiment Modules

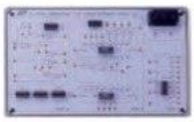
1. All 13 modules are equipped with an 8-bit DIP switch for fault simulation. Users learn how to solve various problems by setting the DIP switch to different positions
2. Solutions for all fault test are listed in the experiment manual for user's reference.
3. 2mm plugs and sockets are used throughout the main unit and all modules.
4. Comprehensive experiment manual and instructor's manual
5. Module dimension : 255x165x30mm.
6. Connection plugs are used on the modules to prevent accidental damages.
7. Individual keeping case for each module.

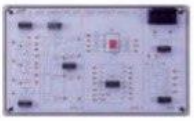
List of Modules


KL-33001
Basic Logic Gates Experiments


KL-33002
Combinational Logic Circuit Experiments(1)

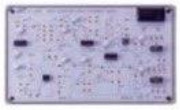

KL-33003
Combinational Logic Circuit Experiments (2)


KL-33004
Combinational Logic Circuit Experiments (3)

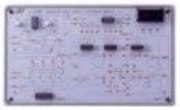

KL-33005
Combinational Logic Circuit Experiments (4)


KL-33006
Combinational Logic Circuit Experiments (5)

KL-300

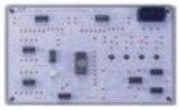


KL-33007
Clock Generator Circuit Experiments

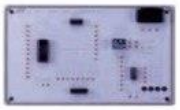


KL-33008
Sequential Logic Circuit Experiments (1)

KL-33009
Sequential Logic Circuit Experiments (2)

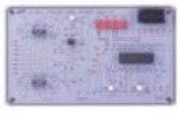


KL-33010
Memory Circuit Experiments (1)



KL-33011
Memory Circuit Experiments (2)

KL-33012
Converter Circuit Experiments (1)



KL-33013
Converter Circuit Experiments (2)

List of Experiments

1. Basic Logic Gates Experiments
   - 1-1 Introduction to logic gates and switches.....KL-33001(A)
   - 1-2 Logic gates circuits
     - a. Diode Logic (DL) circuit .....KL-33001(C)
     - b. Resistor-Transistor Logic (RTL) circuit.....KL-33001(B)
     - c. Diode-Transistor Logic (DTL) circuit.....KL-33001(B.C)
     - d. Transistor-Transistor Logic (TTL) circuit.....KL-33001(D)
     - e. CMOS logic circuit .....KL-33001(E)
   - 1-3 Threshold voltage measurement
     - a. TTL threshold voltage measurement.....KL-33001(D)
     - b. CMOS threshold voltage measurement...KL-33001(E)
   - 1-4 Voltage/current measurement
     - a. TTL I/O voltage/current measurement.....KL-33001(D)
     - b. CMOS voltage/current measurement .....KL-33001(E)
   - 1-5 Basic logic gate transmission delay measurement
     - a. TTL gate delay time measurement .....KL-33001(D)
     - b. CMOS gate delay time measurement.....KL-33001(E)
   - 1-6 Measurement of basic logic gates characteristics
     - a. AND gate characteristics measurement .....KL-33001(D)
     - b. OR gate characteristics measurement .....KL-33001(D)
     - c. INVERTER gate characteristics measurement .....KL-33001(D)
     - d. NAND gate characteristics measurement....KL-33001(D)
     - e. NOR gate characteristics measurement.....KL-33001(D)
     - f. XOR gate characteristics measurement.....KL-33001(D)
   - 1-7 Interface between logic gates
     - a. TTL to CMOS interface .....KL-33001(D.E)
     - b. CMOS to TTL interface .....KL-33001(D.E)
2. Combinational Logic Circuits Experiments
   - 2-1 NOR gate circuits .....KL-33002(A)
   - 2-2 NAND gate circuit .....KL-33002(B)
   - 2-3 XOR gate circuit
     - a. Constructing XOR gate with NAND gate.....KL-33002(B)
     - b. Constructing XOR gate with basic gate.....KL-33002(C)
   - 2-4 AND-OR-INVERT (AOI) gate circuit .....KL-33002(C)
   - 2-5 Comparator circuits
     - a. Comparator constructed with basic logic gates .....KL-33002(C)
     - b. Comparator constructed with TTL IC.....KL-33002(D)
   - 2-6 Schmitt gate circuit .....KL-33002(A)
   - 2-7 Open-collector gate circuits
     - a. High voltage/current circuit .....KL-33002(E)
     - b. Constructing an AND gate with open-collector gate .....KL-33002(E)
   - 2-8 Tristate gate circuits
     - a. Truth table measurements .....KL-33003(C)
     - b. Constructing an AND gate with tristate gate .....KL-33003(C)
     - c. Bidirectional transmission circuit .....KL-33003(C)
   - 2-9 Half-adder and full-adder circuits
     - a. Constructing HA with basic logic gates.....KL-33004(A)
     - b. Full adder circuit.....KL-33004(B)
     - c. High-speed adder carry generator circuit.....KL-33003(A)
     - d. BCD code adder circuit .....KL-33004(B)
   - 2-10 Half-subtractor and full-subtractor circuit
     - a. Subtractor circuit constructed with basic logic gates .....KL-33004(A)
     - b. Full adder and inverter circuit .....KL-33004(B)
   - 2-11 Arithmetic Logic Unit (ALU) circuit.....KL-33003(B)
   - 2-12 Bit parity generator circuit
     - a. Bit parity generator constructed with XOR gates .....KL-33004(A)
     - b. Bit parity generator IC.....KL-33003(D)

KL-300

2-13 Encoder circuit
- a. Constructing a 4-to-2 encoder with basic gates .....KL-33005(A)
- b. Constructing a 10-to-4 encoder with TTL IC .....KL-33006(A)

2-14 Decoder circuit
- a. Constructing a 2-to-4 decoder with basic gates .....KL-33005(C)
- b. Constructing a 4-to-10 decoder with TTL IC .....KL-33004(C)
- c. BCD to 7-segment decoder .....KL-33005(B)

2-15 Multiplexer circuit
- a. Constructing a 2-to-1 multiplexer.....KL-33006(E)
- b. Using multiplexers to create functions .....KL-33006(F)
- c. Constructing a 8-to-1 multiplexer with TTL IC .....KL-33006(F)

2-16 Demultiplexer circuit
- a. Constructing a 2-output demultiplexer.....KL-33006(E)
- b. Constructing a 8-output demultiplexer....KL-33006(B)

2-17 Digitally controlled analog multiplexer/demultiplexer circuit
- a. Analog switch characteristics.....KL-33006(C.D)
- b. Bidirectional transmission with CMOS IC analog switches .....KL-33006(C)

3. Clock Generator Circuit Experiments

3-1 Constructing oscillator circuit with basic logic gates .....KL-33007(A)

3-2 Constructing oscillator circuit with schmitt gate .....KL-33007(B)

3-3 Voltage controlled oscillator (VCO) circuit .....KL-33007(C)

3-4 555 IC oscillator circuit
- a. 555 oscillator circuit .....KL-33007(D)
- b. VCO circuit .....KL-33007(D)

3-5 Monostable multivibrator circuits
- a. Low-speed monostable multivibrator circuits .....KL-33007(E)
- b. High-speed monostable multivibrator circuits .....KL-33007(E)
- c. Constructing monostable multivibrator circuits .....KL-33007(D)
- d. Constructing non-retriggerable circuit with TTL-IC .....KL-33007(F)
- e. Constructing retriggerable circuit with TTL-IC .....KL-33007(G)
- f. Constructing a variable duty cycle oscillator circuit with monostable multivibrator.....KL-33008(A)

4. Sequential Logic Circuit Experiments

4-1 Flip-flop circuits
- a. Constructing a R-S flip-flop with a basic logic gates .....KL-33008(D)
- b. Constructing a D flip-flop with a R-S flip-flop .....KL-33008(D)
- c. Constructing a J-K flip-flop with a D flip-flop .....KL-33008(D)
- d. Constructing a J-K flip-flop with a R-S flip-flop .....KL-33008(D)
- e. Constructing a shift register with a D flip-flop .....KL-33008(C)
- f. Preset left/right shift register.....KL-33008(B)
- g. Constructing a noise elimination circuit with R-S flip-flop .....KL-33008(D)

4-2 J-K flip-flop circuits
- a. Asynchronous binary up-counter.....KL-33009(A)
- b. Asynchronous decade up-counter.....KL-33010(D)
- c. Asynchronous divide-by-N up-counter .....KL-33010(C)
- d. Asynchronous binary down-counter.....KL-33009(A)
- e. Synchronous binary up-counter.....KL-33009(A)
- f. Synchronous binary up/down counter.....KL-33009(A)
- g. Presetable synchronous binary up/down counter .....KL-33010(A)
- h. Presetable synchronous decimal up/down counter .....KL-33010(B)
- i. Ring counter .....KL-33009(A)
- j. Johnson's counter .....KL-33009(A)

5. Memory Circuit Experiments

5-1 Constructing Read Only Memory (ROM) with diodes .....KL-33010(F)

5-2 Constructing Random Access Memory (RAM) with D flip-flop .....KL-33010(G)

5-3 64-bit RAM circuit .....KL-33011(B)

5-4 Erasable Programmable Read Only Memory (EPROM) circuit .....KL-33010(E)

5-5 Electronic EPROM (EEPROM) circuit .....KL-33011(A)

5-6 Constructing dynamic scanning counter with single-chip microprocessor .....KL-33012(A)

6. Converter Circuit Experiment

6-1 Digital/Analog Converter (DAC) circuit
- a. Unipolar DAC circuit .....KL-33013(A)
- b. Bipolar DAC circuit .....KL-33013(A)

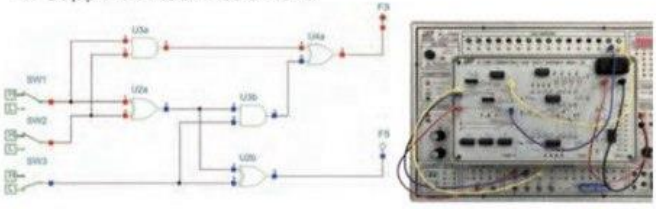
6-2 Analog/Digital Converter (ADC) circuit
- a. 8-bit converter circuit.....KL-33012(B)
- b. 3 1/2-digit converter circuit .....KL-33013(B)

● Accessories(KL-38002)

1. Experiment manual and instructor's manual
2. Connection leads and plugs : 1 set
3. Key : 1 pce

● Computer-Based Training

1. Build-in circuit simulation of experiment modules.
2. Fault simulation is allowed.
3. Users can flexibly compare the simulation analysis result with hardware signal output.
4. Support virtual instrument.

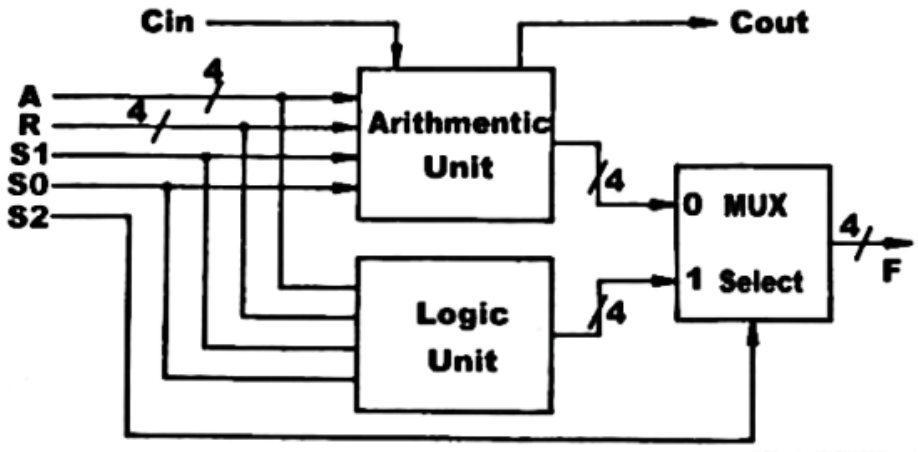


EXP: Arithmatic Logic Unit (ALU) Circuit

1. Objective

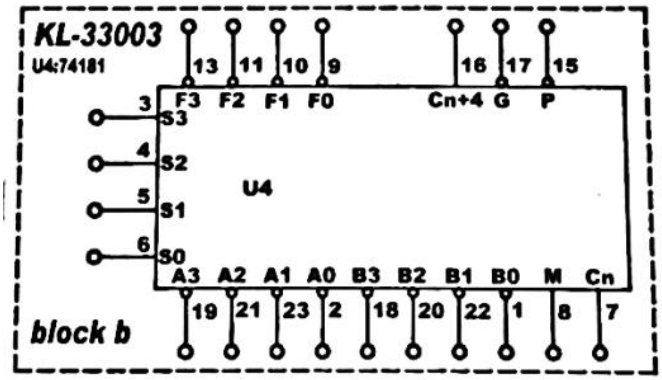
Understanding functions and applications of the ALU, or arithmetic logic unit.

2. EXP diagram



3. Components

KL-31001 Digital Logic Lab, Module KL-33003



4. Produce

→ Connect function-select lines S3~SO to Data Switches SW3- SWO respectively.

→ Connect M to DIP Switch DIP1.6 to select between arithmetic and logic operation.

→ When M="0" arithmetic operation is performed.

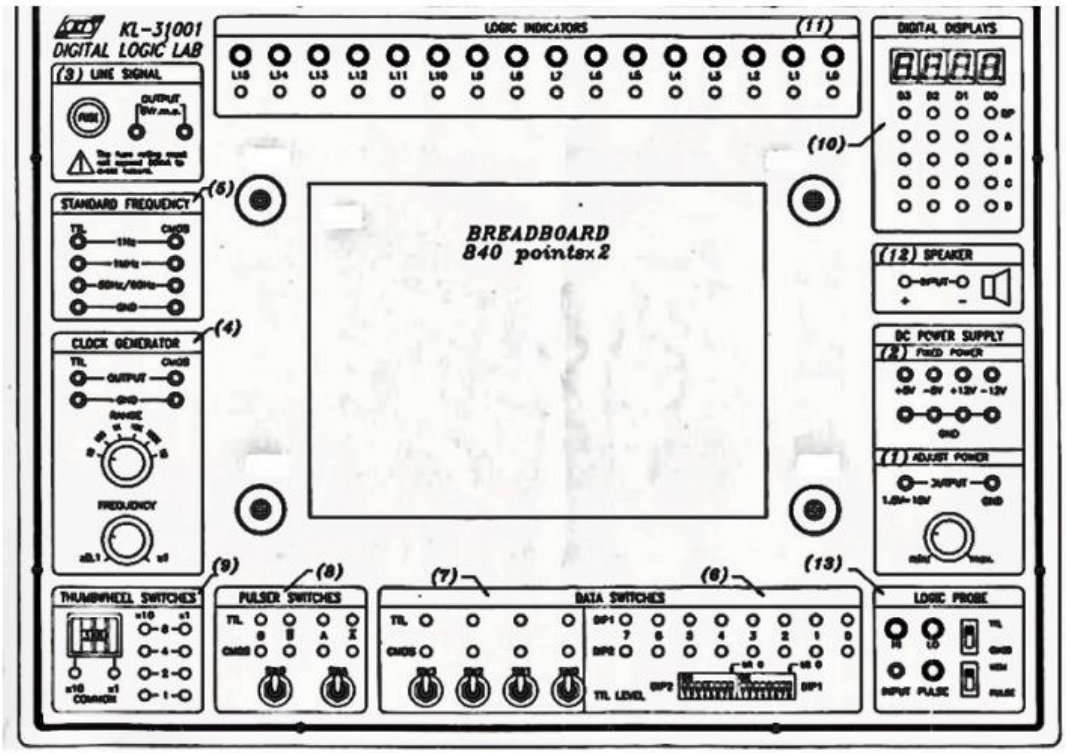
→ When M="1" logic function is performed.

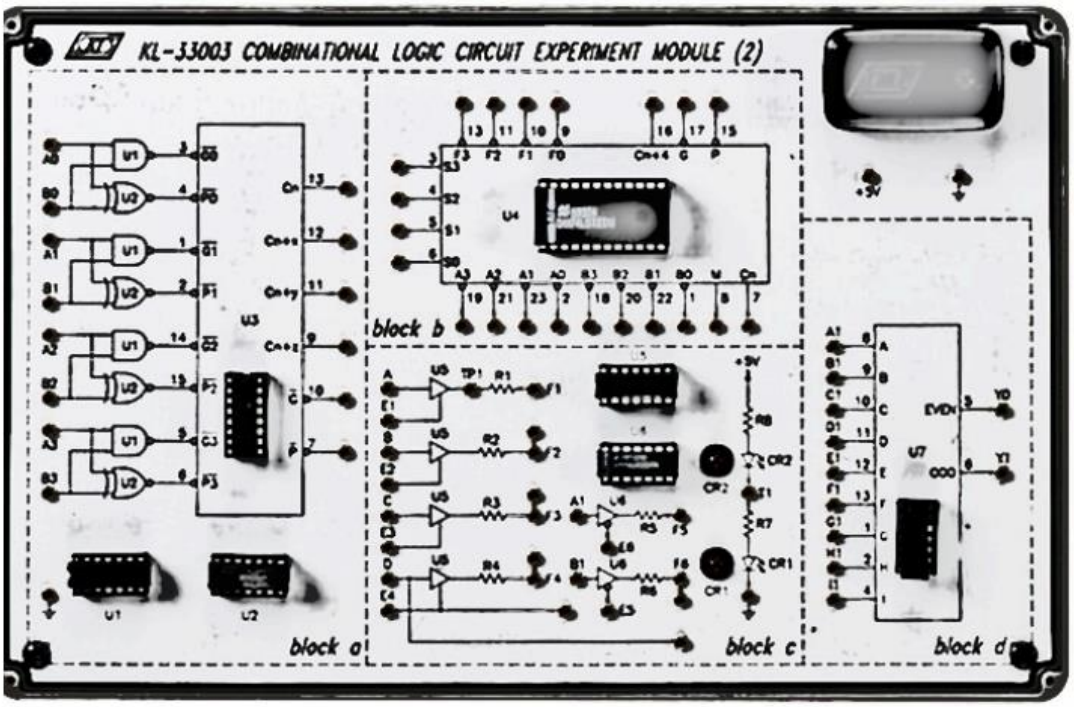
→ Connect inputs A3-A0 to DIP1.3~1.0 and B3-B0 to DIP2.3~2.0: Connect DIP2.6;outputs F3-F0 to Logic Indicators L4-L1 and Cn+4 to L8. Inputs A3-A0, B3-B0 and outputs F3-F0 are triggered by "0". Low input state is "1" while high input state is "0".

→ This table show the functions
For each mode.

SELECTION				ACTIVE HIGH DATA		
				M=H LOGIC FUNCTIONS	M=L; ARITHMETIC OPERATIONS	
S3	S2	S1	S0		$\overline{C_n}$ =H (no carry)	$\overline{C_n}$ =L (with carry)
L	L	L	L	F=$\overline{A}$	F=A	F=A plus 1
L	L	L	H	F=$\overline{A+B}$	F=A+B	F=(A+B) plus 1
L	L	H	L	F=$\overline{A}B$	F=A+$\overline{B}$	F=(A+$\overline{B}$) plus 1
L	L	H	H	F=0	F= minus 1 (2's compl)	F= zero
L	H	L	L	F=$\overline{AB}$	F=A plus A$\overline{B}$	F= A plus A$\overline{B}$ plus 1
L	H	L	H	F=$\overline{B}$	F=(A+B) plus A$\overline{B}$	F=(A+B) plus A$\overline{B}$ plus 1
L	H	H	L	F= A⊕B	F=A minus B minus 1	F=A minus B
L	H	H	H	F=A$\overline{B}$	F=A$\overline{B}$ minus 1	F=A$\overline{B}$
H	L	L	L	F=$\overline{A}$+B	F=A plus AB	F=A plus AB plus 1
H	L	L	H	F=$\overline{A \oplus B}$	F=A plus B	F=A plus B plus 1
H	L	H	L	F= B	F=(A+$\overline{B}$) plus AB	F=(A+$\overline{B}$) plus AB plus 1
H	L	H	H	F= AB	F= AB minus 1	F=AB
H	H	L	L	F=1	F=A plus A*	F=A plus A plus 1
H	H	L	H	F=A+$\overline{B}$	F=(A+B) plus A	F=(A+B) plus A plus 1
H	H	H	L	F= A+B	F=(A+$\overline{B}$) plus A	F=(A+$\overline{B}$) plus A plus 1
H	H	H	H	F=A	F=A minus 1	F=A

* Each bit is shifted to the next more significant position


KL-31001
DIGITAL LOGIC LAB
LOGIC INDICATORS
DIGITAL DISPLAYS
(3) LINE SIGNAL
STANDARD FREQUENCY
CLOCK GENERATOR
BREADBOARD
840 pointsx2
(12) SPEAKER
DC POWER SUPPLY
THUMBWHEEL SWITCHES
PULSER SWITCHES
DATA SWITCHES
LOGIC PROBE

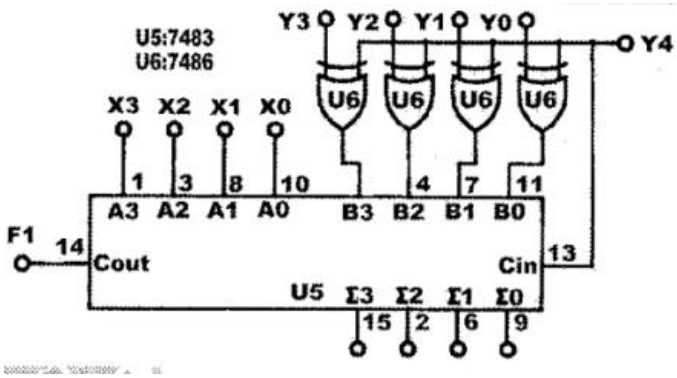

KL-33003 COMBINATIONAL LOGIC CIRCUIT EXPERIMENT MODULE (2)
block a
block b
block c
block d

EXP: Adder-Subtactor circuit

1. Objective

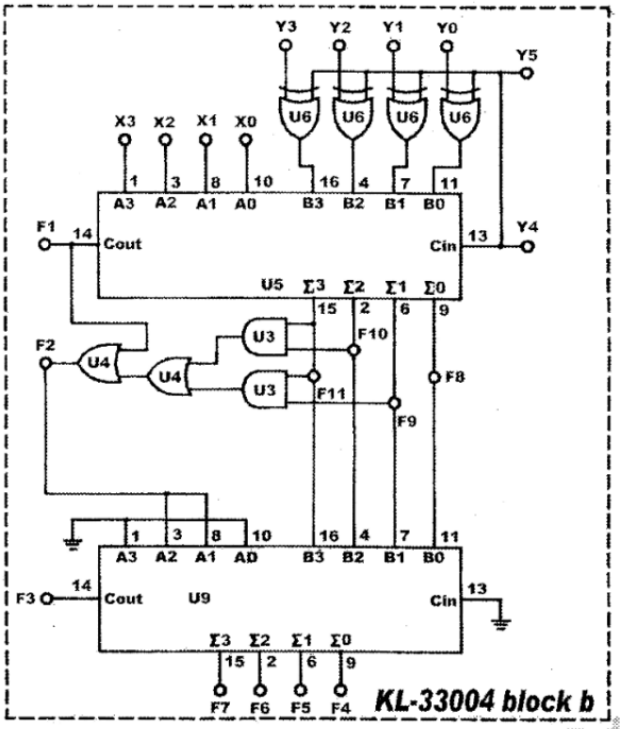
Understanding functions and applications of the Adder-Subtactor circuit .

2. EXP diagram



3. Components

KL-31001 Digital Logic Lab , Module KL-33004



4. Produce

→ Connect inputs X3-X0 to DIP Switch 1.3~1.0; Y3~Y0 to DIP 2.3~DIP 2.0; Y5 to SWO.
Connect outputs F1 to L1; F11~F8 to L5-L2.

→ To execute the subtract operation, connect Y5 to "1"

→ To execute the add operation, connect Y5 to "0"

→ Follow the input sequences below and record the output states in Table.

INPUT								OUTPUT				
X3	X2	X1	X0	Y3	Y2	Y1	Y0	F1	F11	F10	F9	F8
0	1	0	0	0	1	0	0					
0	1	0	0	0	0	1	1					
1	0	0	0	0	0	1	1					
1	0	0	0	0	0	0	1					
1	0	0	1	1	0	0	0					
1	0	0	1	0	1	1	1					
1	0	1	0	0	1	1	0					
1	0	1	0	0	1	0	1					
1	0	1	1	1	0	1	0					
1	1	1	1	1	0	1	0					

EXP: MARIE

1. Objective

MARIE, a **M**achine **A**rchitecture that is **R**eally **I**ntuitive and **E**asy, is a simple architecture consisting of memory (to store programs and data) and a CPU (consisting of an ALU and several registers).

2. How to Download and Use the MARIE Machine Simulator

→ To use MARIE Machine Simulator, you need first install the Java virtual machine (JRE), which could be downloaded at (http://java.sun.com/javase/downloads/index.jsp)

→ Download MARIE Machine Simulator (MarieSim---v1.3.01.zip) at (http://computerscience.jbpub.com/ecoa/2e/studentresources.cfm) and unzip it.

→ Run the file "MarieSim.jar" and you will see the simulator.

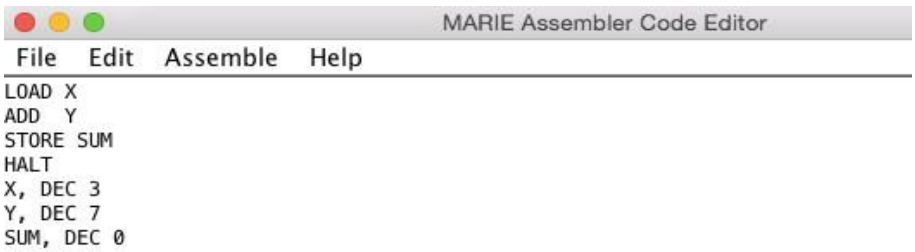
→ Click "File"---------"Edit" on the simulator, then write or paste your codes on the editor and save it as a .mas file.

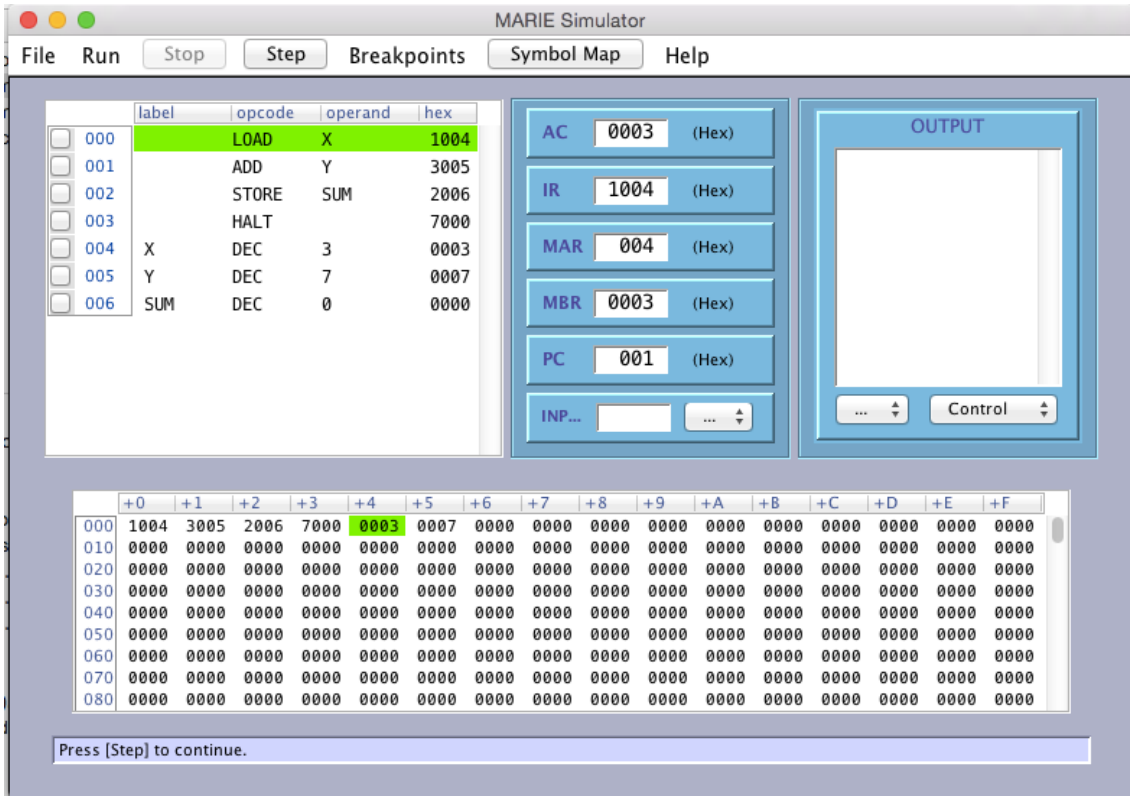
→ Click "Assemmble"---------"Assemmble current file" on the editor, if successful, the .mas file will be assembled to a .mex file.

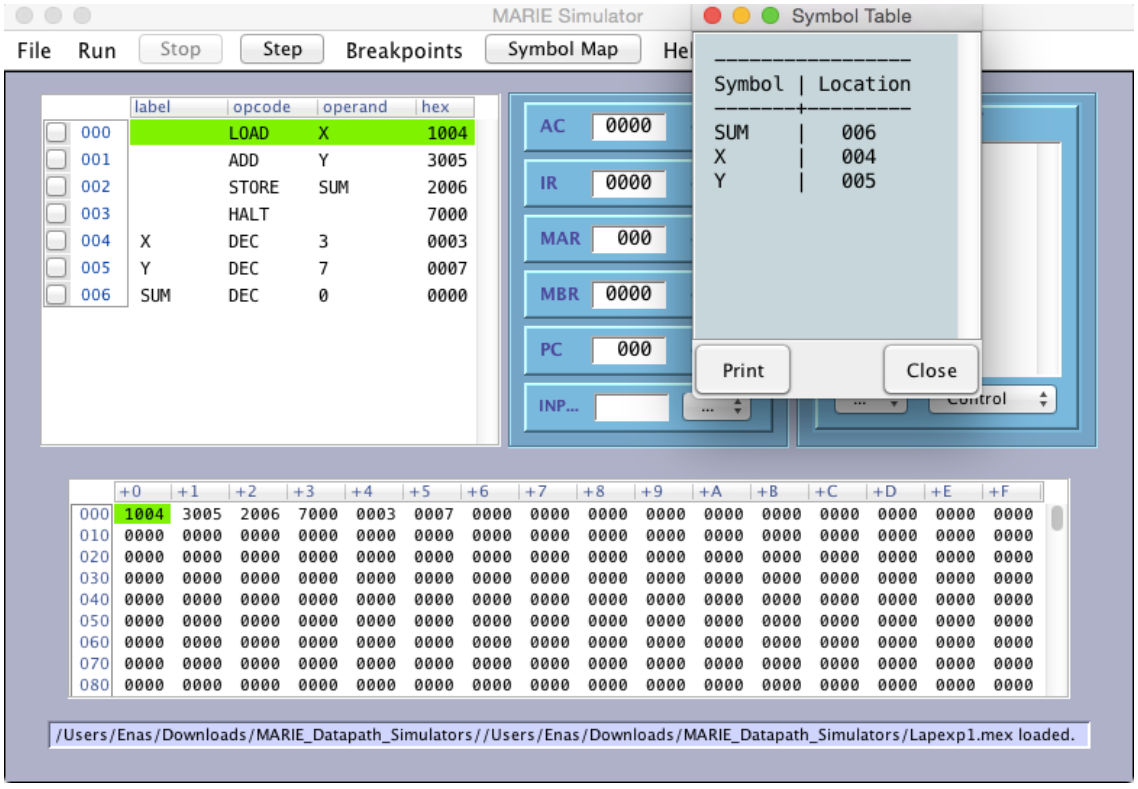
→ Click "Load" on simulator and load your .mex file. Then click RUN or STEP to watch your program.

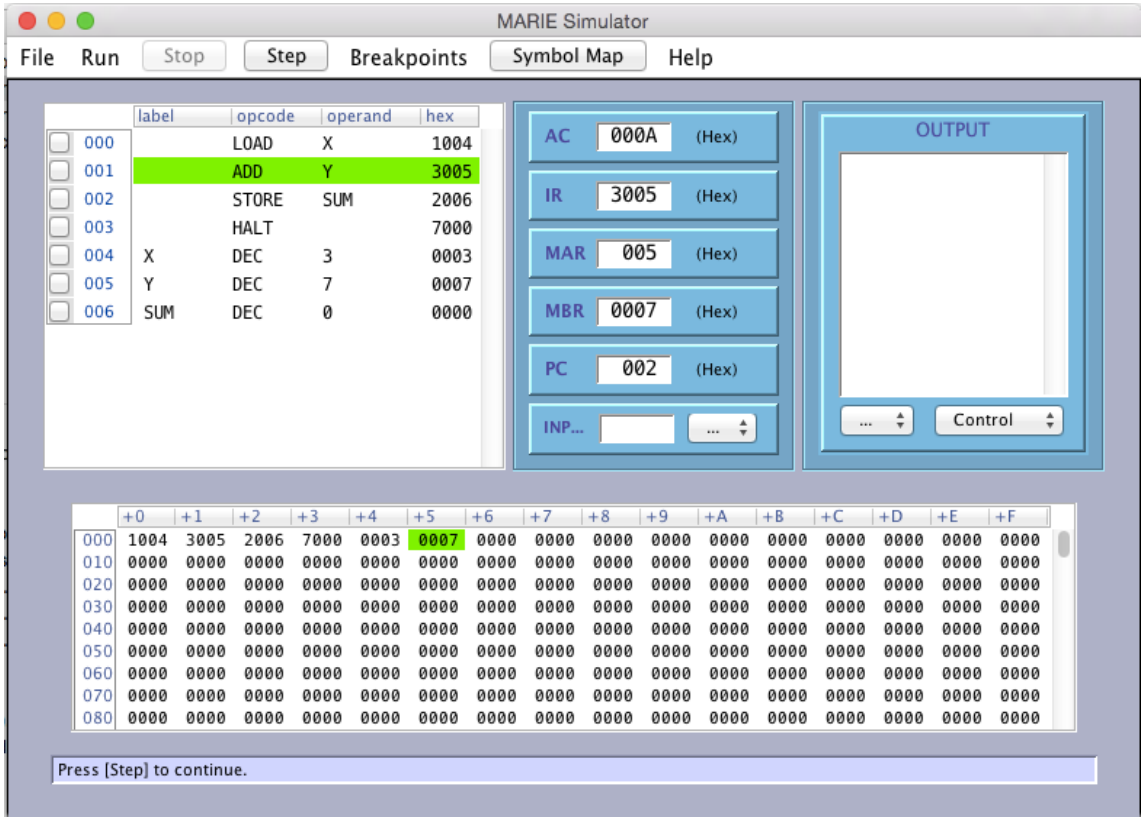
→ You can refer to MarieGuide.doc in the zip file for more details.

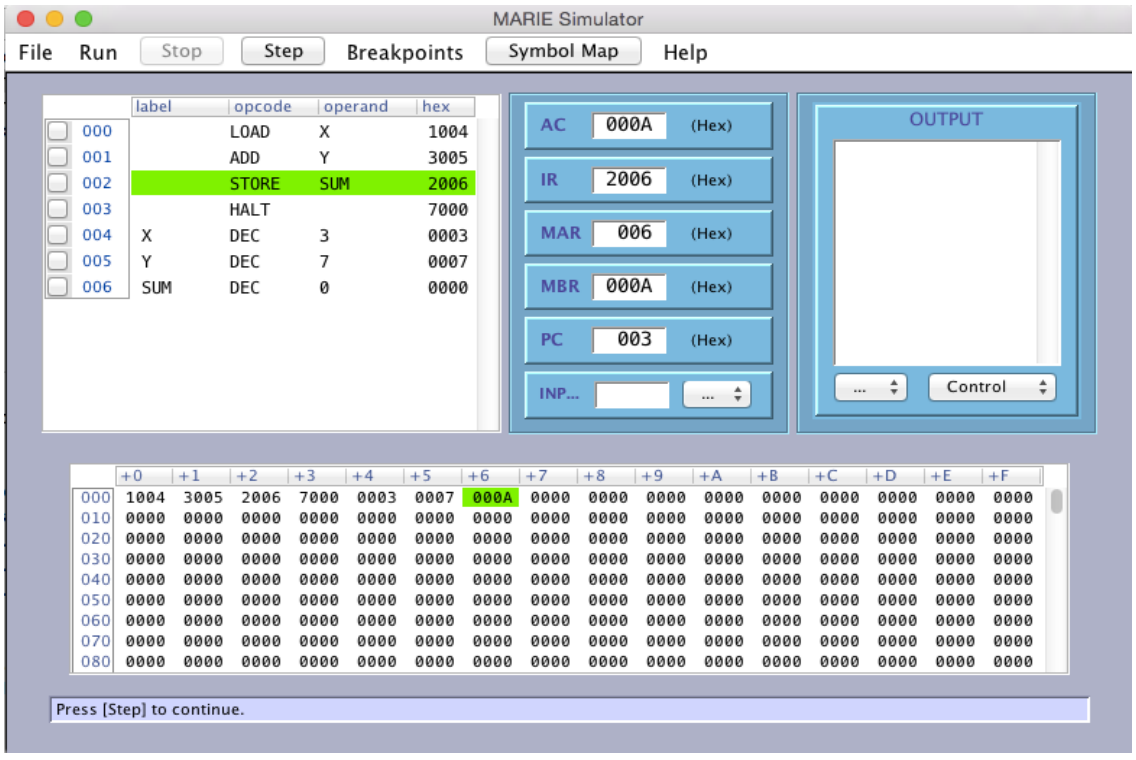
3. Produce

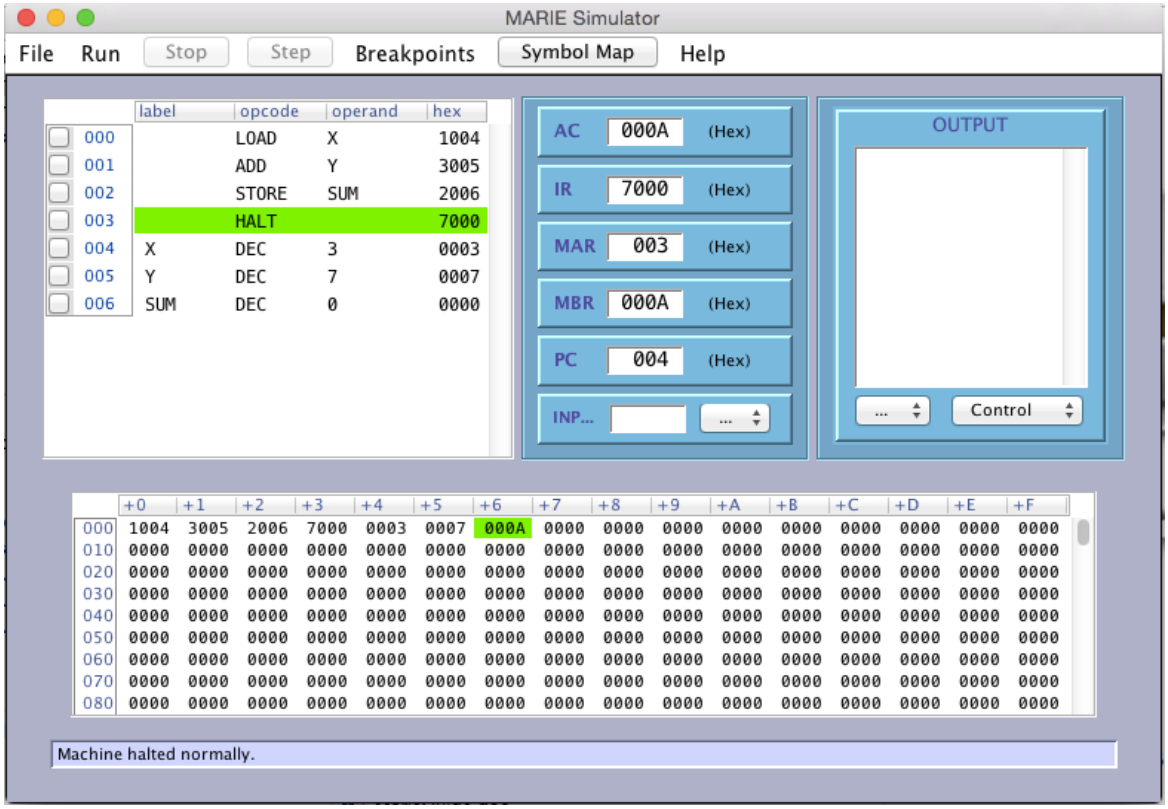



MARIE Simulator
File Run Stop Step Breakpoints Symbol Map Help
label opcode operand hex
000 LOAD X 1004
001 ADD Y 3005
002 STORE SUM 2006
003 HALT 7000
004 X DEC 3 0003
005 Y DEC 7 0007
006 SUM DEC 0 0000
AC 0003 (Hex)
IR 1004 (Hex)
MAR 004 (Hex)
MBR 0003 (Hex)
PC 001 (Hex)
INP...
OUTPUT
Control
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 1004 3005 2006 7000 0003 0007 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
040 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
050 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
060 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
070 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
080 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Press [Step] to continue.


MARIE Simulator
File Run Stop Step Breakpoints Symbol Map
Symbol Table
Symbol | Location
SUM | 006
X | 004
Y | 005
Print
Close
label opcode operand hex
000 LOAD X 1004
001 ADD Y 3005
002 STORE SUM 2006
003 HALT 7000
004 X DEC 3 0003
005 Y DEC 7 0007
006 SUM DEC 0 0000
AC 0000
IR 0000
MAR 000
MBR 0000
PC 000
INP...
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 1004 3005 2006 7000 0003 0007 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
040 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
050 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
060 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
070 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
080 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
/Users/Enas/Downloads/MARIE_Datapath_Simulators//Users/Enas/Downloads/MARIE_Datapath_Simulators/Lapexp1.mex loaded.


MARIE Simulator
File Run Stop Step Breakpoints Symbol Map Help
label opcode operand hex
000 LOAD X 1004
001 ADD Y 3005
002 STORE SUM 2006
003 HALT 7000
004 X DEC 3 0003
005 Y DEC 7 0007
006 SUM DEC 0 0000
AC 000A (Hex)
IR 3005 (Hex)
MAR 005 (Hex)
MBR 0007 (Hex)
PC 002 (Hex)
INP...
OUTPUT
Control
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 1004 3005 2006 7000 0003 0007 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
040 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
050 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
060 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
070 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
080 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Press [Step] to continue.


MARIE Simulator
File Run Stop Step Breakpoints Symbol Map Help
label opcode operand hex
000 LOAD X 1004
001 ADD Y 3005
002 STORE SUM 2006
003 HALT 7000
004 X DEC 3 0003
005 Y DEC 7 0007
006 SUM DEC 0 0000
AC 000A (Hex)
IR 2006 (Hex)
MAR 006 (Hex)
MBR 000A (Hex)
PC 003 (Hex)
INP...
OUTPUT
Control
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 1004 3005 2006 7000 0003 0007 000A 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
040 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
050 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
060 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
070 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
080 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Press [Step] to continue.

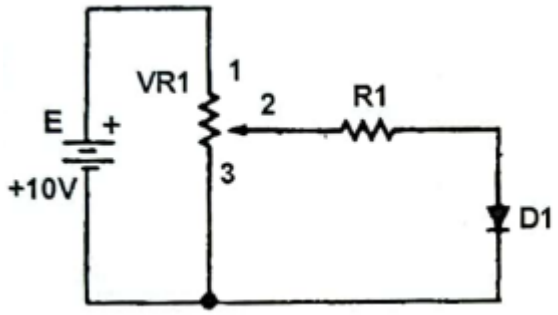

MARIE Simulator
File
Run
Stop
Step
Breakpoints
Symbol Map
Help
label
opcode
operand
hex
000 LOAD X 1004
001 ADD Y 3005
002 STORE SUM 2006
003 HALT 7000
004 X DEC 3 0003
005 Y DEC 7 0007
006 SUM DEC 0 0000
AC 000A (Hex)
IR 7000 (Hex)
MAR 003 (Hex)
MBR 000A (Hex)
PC 004 (Hex)
INP...
OUTPUT
Control
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 1004 3005 2006 7000 0003 0007 000A 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
040 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
050 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
060 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
070 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
080 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Machine halted normally.

EXP: Diode Charactersitics

1. Objective

To study the characteristics of a typical pn-junction diode.
To construct the I-V curve of a typical pn-junction diode.

2. EXP diagram



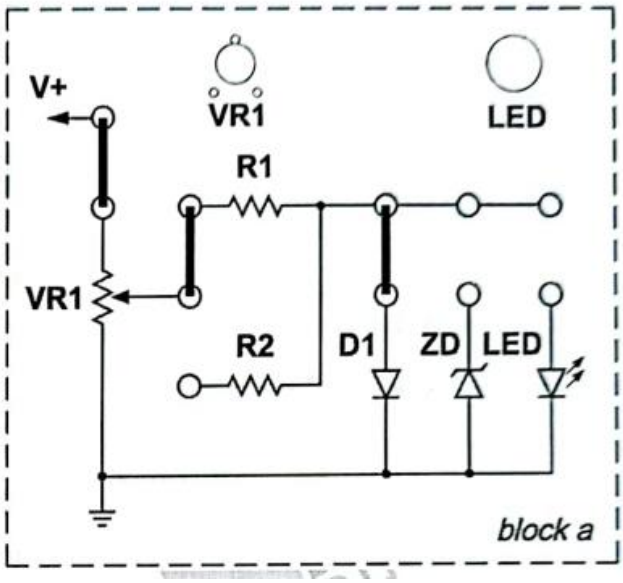
3. Components

module KL-13007

4. Produce

→ Set the module KL-13007 on the main unit KL-21001, and then locate block a.

→ complete experiment circuit with short-circuit clips.



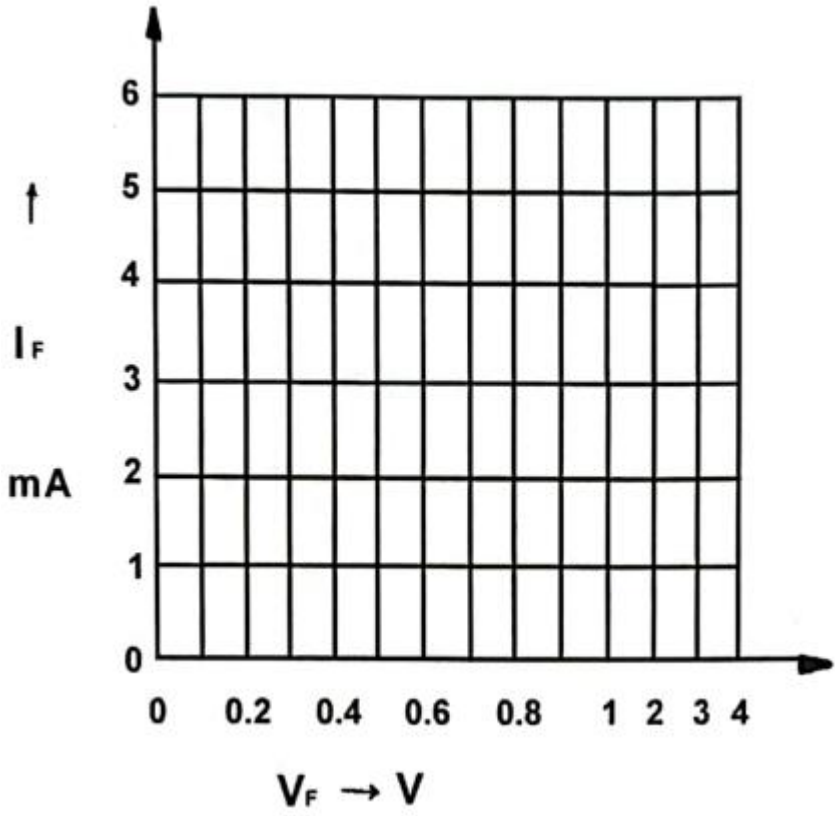
→ Set the positive power supply to +10V and apply to V+ terminal.

→ Using the voltmeter, measure and record the voltage between the end terminals 1 and 3 of VR1.
The VR1 is used for adjusting the voltage applied to the diode D1 and the R1 is a current-limit resistor for protecting the diode D1.

→ Turn VR1 and measure the voltage across R1 to obtain a 0.1V.
This will obtain a forward current IF=0.1mA (0.1V/R1=0.1V/1K) throgh the D1.
When I reaches 0.1mA, measure the voltage across D1 and record it as Ve in

→ Complete other measurements of Ve values .

→ Plot the recorded values of If and Ve on the graph.

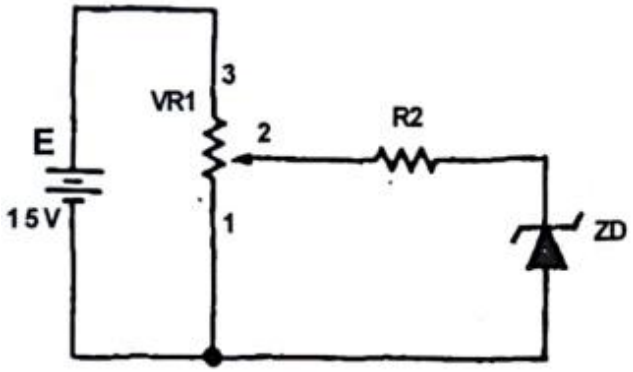


EXP: Zener Characteristics

1. Objective

To study the characteristics of a zener diode.
To measure the zener voltage and current of a zener diode.

2. EXP diagram



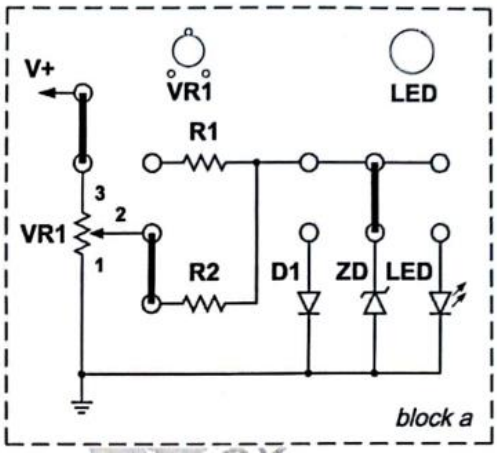
3. Components

module KL-13007

4. Produce

→ Set the module KL-13007 on the main unit KL-21001, and then locate block a.

→ close experiment circuit with short-circuit clips.



5. Apply +15V to V+ terminal.
6. Connect the DC voltmeter across ZD terminals.
7. Turn the VR1 gradually from the left to right and observe the

change of ZD voltage until it remains constant.

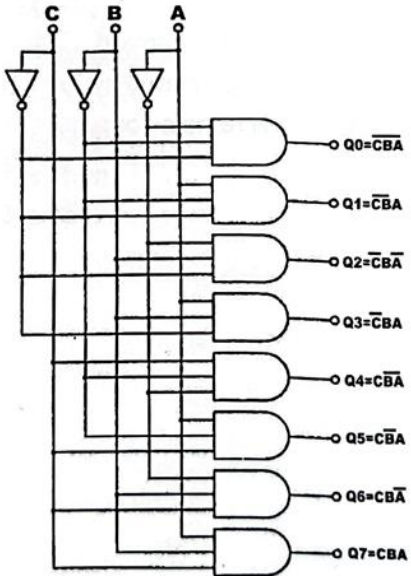
8. Measure the voltage across R2.
9. Calculate the current by using Ir2 = Izo = Vrz / R2 and record the result.
10. Measure the input voltage Vin between terminals 1 and 2 of VR1 and record the result.

EXP: Decoder Circuit

1. Objective

Understanding the operating principles of decoder circuits

2. EXP diagram

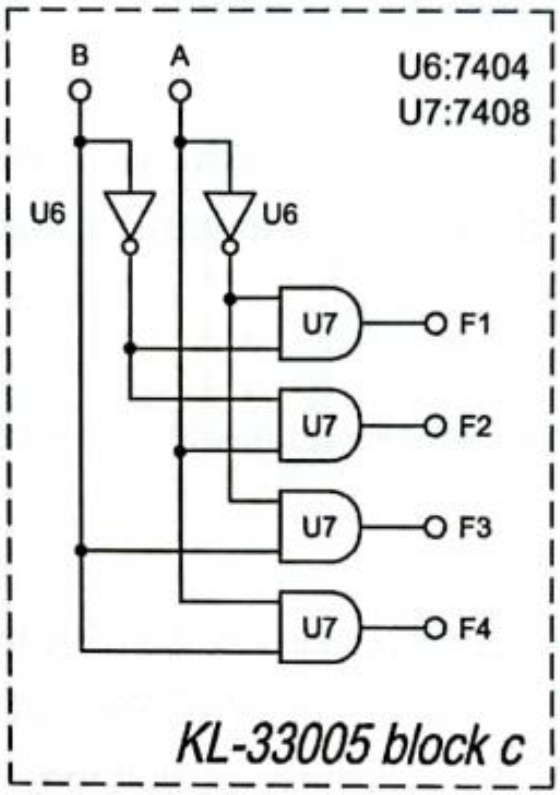


3. Components

KL-31001 Digital Logic Lab; Module KL-33004/KL-33005; Multimeter

4. Produce

→ Constructing a 2-to-4 Decoder with Basic Gates
→ Connect Vcc to +5V.
→ Connect inputs A, B to Data Switches SWO and SW1.
→ Connect outputs F1~F4 to Logic Indicators. Lo-L3 respectively.



→ Follow the input sequences for A and B in table

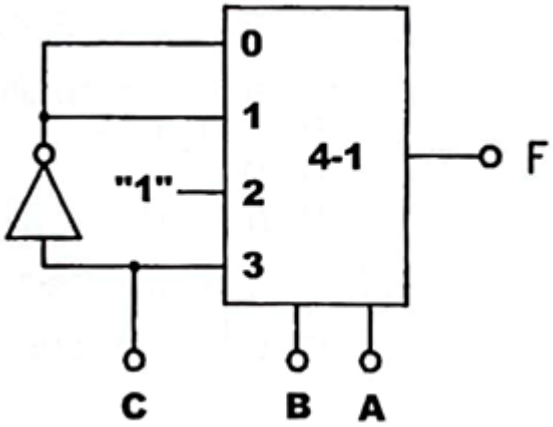
B	A	F1	F2	F3	F4
0	0				
0	1				
1	0				
1	1				

EXP: Multiplexer Circuit

1. Objective

Understanding the operating principles and construction of multiplexers.

2. EXP diagram



3. Components

KL-31001 Digital Logic Lab, Module KL-33006

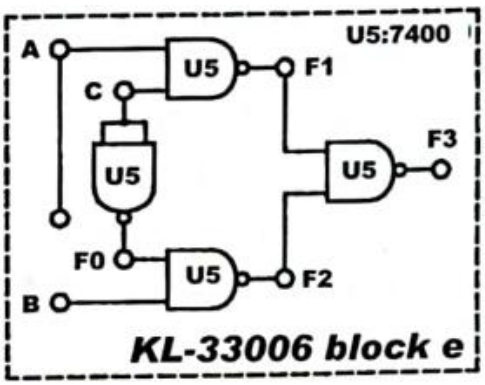
4. Produce

→ Constructing a 2-to-1 Multiplexer

→ Connect inputs A, B to Data Switches SWO, SW1; selector C to SW2.

→ Connect output F3 to Logic Indicator LO.

→ Follow the input sequences in table



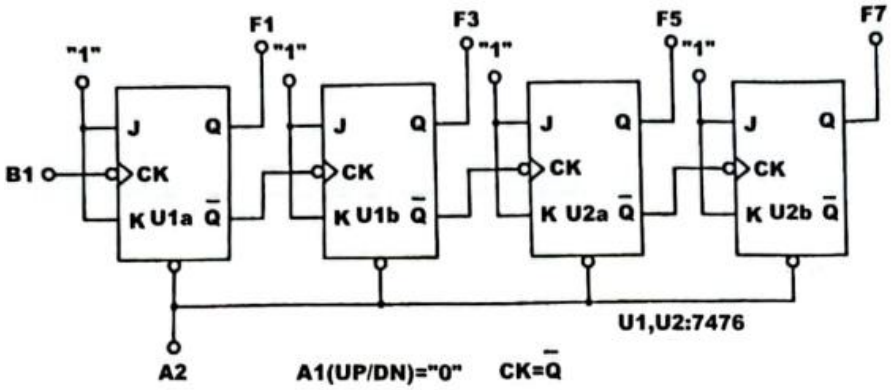
C	B	A	F3
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

EXP: Counter (Asynchronous Binary Down-Counter)

1. Objective

To understand the operations of counter..

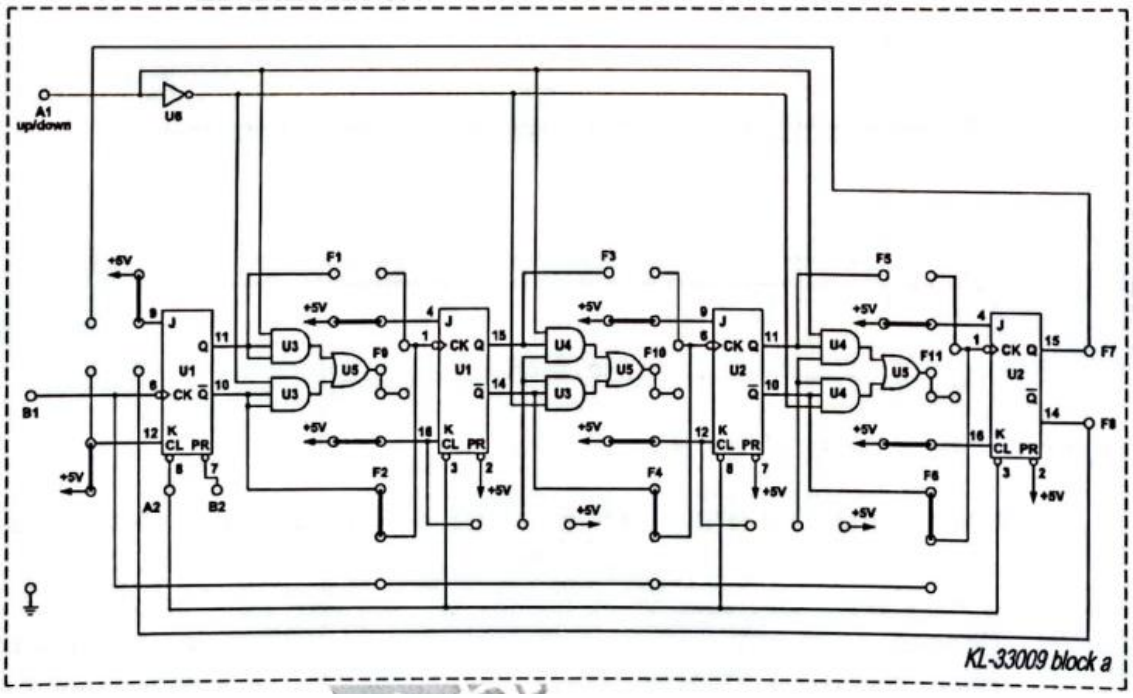
2. EXP diagram



3. Components

KL-31001 Digital Logic Lab, Module KL-33009

4. Produce



→ Insert connection clips according to Fig.

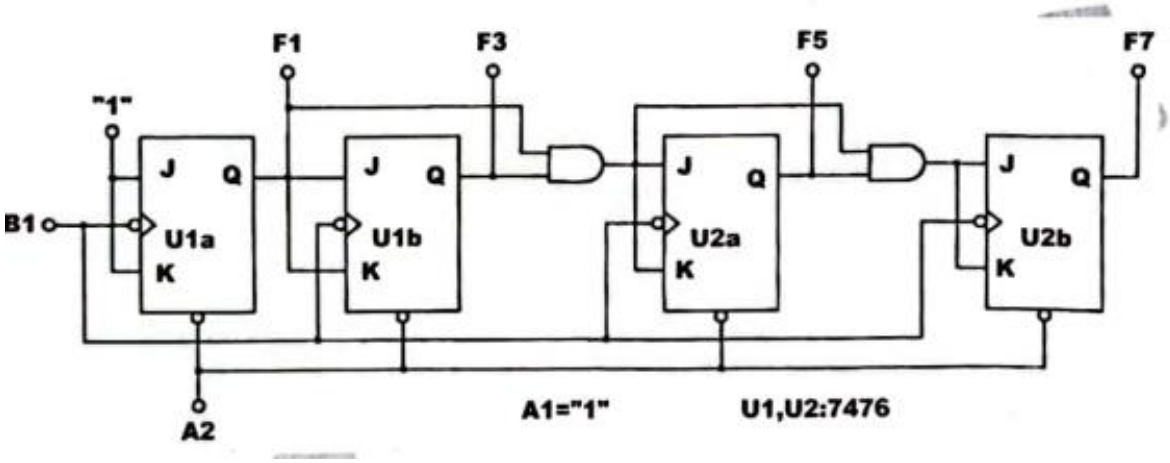
→ Connect A2 to SWO; A1 to +5V; B1 to 1KHz output of the Clock Generator.
→ Connect F1, F3, F5, F7 to L5- L8. Measure the outputs with an oscilloscope.
→ Sketch the output waveforms

EXP: Counter (Synchronous Binary Up-Counter)

1. Objective

To understand the operations of counter..

2. EXP diagram

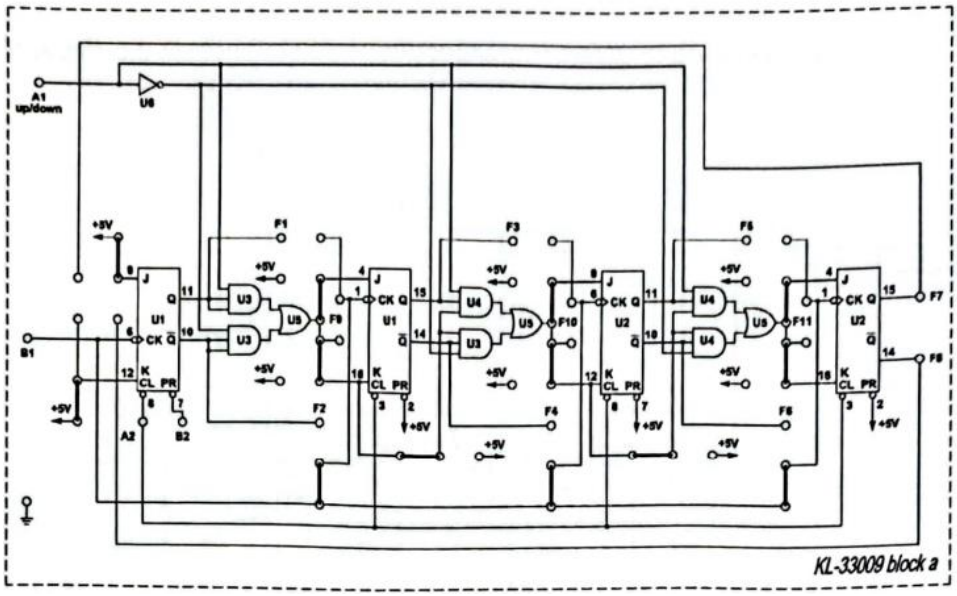


3. Components

KL-31001 Digital Logic Lab, Module KL-33009

4. Produce

→ Insert connection clips according to Fig.



→ Connect A2 to SWO; A1 to +5V; B1 to 1KHz output of the Clock Generator
→ Connect F1, F3, F5, F7 to L5- L8. Measure the outputs with an oscilloscope.
→ Sketch the output waveforms

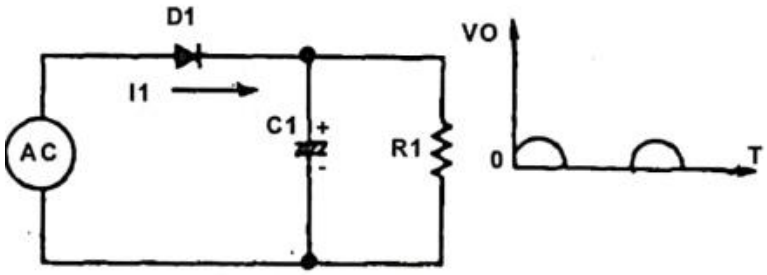
EXP: Rectifier Circuit

1. Objective

To understand the operations of rectifiers.

To learn how the filtering capacitor affects the ripple and output voltage of a rectifier

2. EXP diagram



3. Components

KL-21001 main unit Lab, Module KL-13007

4. Produce

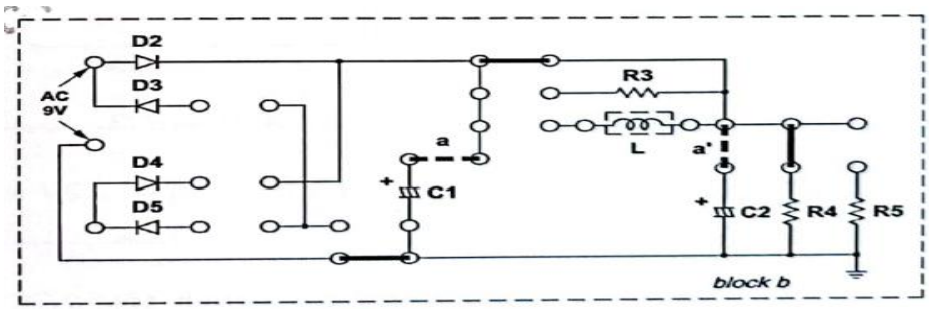
→ Set the module KL-13007 on the main unit KL-21001, and then locate block b.

→ Complete experiment circuit with short-circuit clips.

→ Apply AC source 0-9V to AC9V terminals. This circuit is a half-wave rectifier without a rectifier capacitor.

→ Using the oscilloscope, measure and record the Ac source waveform.

→ Using the oscilloscope, measure the voltage waveform across R4 and record the result.



3. 5 معمل هندسة الكمبيوتر

❖ **اسم المقررات التى يخدمها المعمل**

- تكنولوجيا الحاسبات و برمجه الحاسبات.
- اختبارات كهربية (2).
- تنظيم حاسبات (1).
- المعمل يوجد به 30 جهاز كمبيوتر يحتوي علي برامج القوي الكهربية والتي تخدم مشاريع التخرج.

6. معامل تخدم برنامج القوى الكهربية وعلاقتها بالمقررات

يشمل دراسة لمواضيع مثل الآلات الكهربية، إلكترونيات القوى، التحليل والتحكم والحماية لأنظمة القوى الكهربية والجهد العالي.

6. 1 معمل آلات كهربية 1&2

❖ **اسم المقررات التى يخدمها المعمل**

- الات كهربية 1
- الات كهربية 2
- اختبارات كهربية 2
- اختبارات كهربية 4

❖ **قائمة بالتجارب الموجودة بالمعمل**

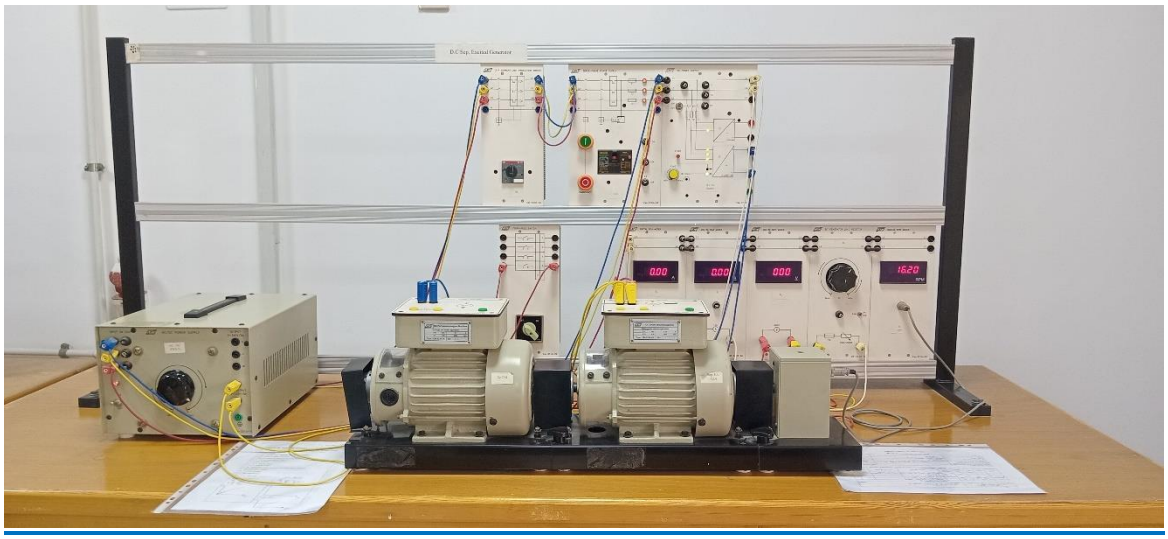
1. Investigation of 3 – Phase Power transformer (15 KVA).
2. DC Separately Excited Generator.
3. Single phase transformer loading Characteristic.
4. DC Shunt generator.
5. Single transformer – open – short test.
6. DC Compound Generator.
7. Digital L.C.R Meter (Model EDC1620)
8. Three phase transformer connection (4 Test).
9. Three phase transformer loading Characteristic.
10. Torque – Speed Characteristic of DC Compound.

EXP. (1) Investigation of 3 Ph Power transformer (15 KVA)

1. Components

- 3ph Primary winding 380 V
- 3ph Secondary winding 220 v
- Main Circuit Braker

EXP. (2) DC Separately Excited Generator



1. Objective

The experiment illustrates the characteristic of open circuit voltage (Emf) due to the changing of field current.

2. Components

- DC Permanent magnet machine 0.4 KW
- DC shunt wound machine.
- Current limit protection switch 2A
- 3 – Ph power supply 10A
- 4 pole switches
- DC A Meter 10A
- DC V Meter 600V
- DC generator load resistor 2A (1K Ohm/ 300W)
- Digital RPM Meter
- AC/DC supply
- Taco Generator

3. Procedures

At no load

1) Sequentially turn on the Three pole current limit protection switch, Three phase power supply, and DC power supply Modules.
2) Press the start button on the DC power supply Module
3) Slowly turn the V.adj knob on the DC power supply Module to increase the motor voltage E until the prime mover rotates at a speed of the rated value.
4) Turn on the 3 phase AC/DC power supply
5) Turn the voltage control knob on the 3 phase AC/DC power supply and set the field current I_f to 0A.Record the generator output voltage E_0
6) Plot the E_o vs If curve

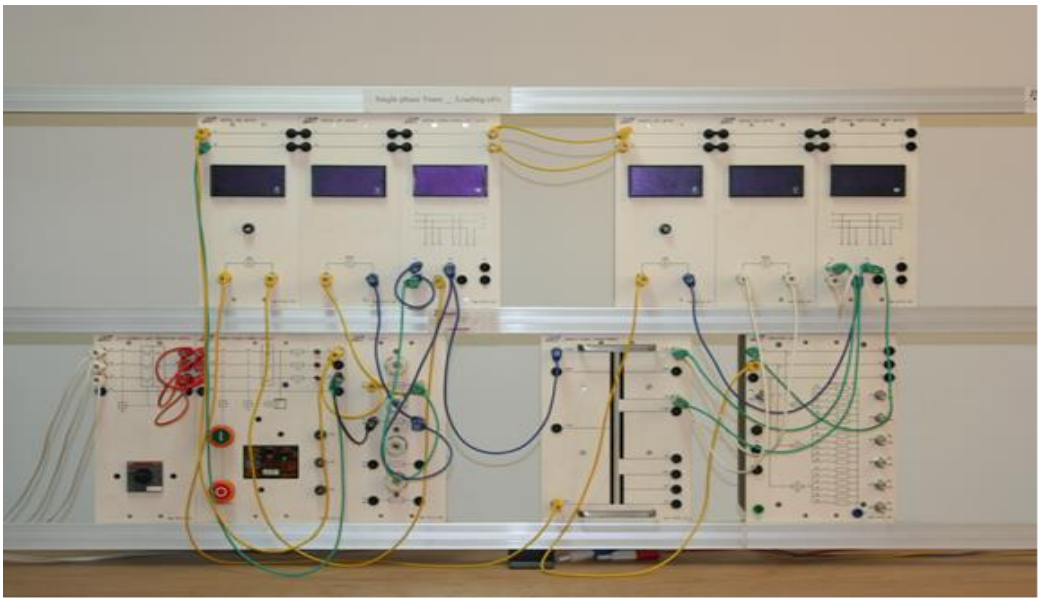
At load

1) Sequentially turn on the Three pole current limit protection switch, Three phase power supply, and DC power supply Modules.
2) Press the start button on the DC power supply Module
3) Slowly turn the V.adj knob on the DC power supply Module to increase the motor voltage and observe the speed of the prime mover until the prime mover rotates at its rated speed.
4) Turn on the 3 phase AC/DC power supply. Turn the voltage control knob on the 3 phase AC/DC power supply and set the field current If to 0.1A. Maintain this If value. Turn the Ω knob on the DC Generator load resistor and set the armature current I_a to 0A. Record the values of Ia, If and E_0. Calculate P_o using the equation $P_o=I_a \times Eo$
5) Plot the E_0 vs I_a curve
6) Plot the P_o vs I_a curve

EXP. (3) Single phase transformer loading Characteristic.

1.Objective

The experiment illustrates the voltage regulation of transformer at different condition of load types.



2.Components

- 3 – ph Current limit switch (2A).
- 3 – Ph power supply (10A).
- Fuse Test (6A).
- Single Phase Transformer (110V-80V-24V-12V).
- 3 – Ph resistive load (920 Ohm/30 w).
- Inductive load (1.7 H * 18).
- Two Digital AC A Meter (10A).
- Two Digital AC V Meter (600 V).
- Two Digital 3- Ph Watt Meter.

3.Procedures

Resistive load

1) Sequentially turn on the 3-P current limit protection switch, three phase power supply, and DC power supply Modules.
2) Record the voltage and current values for each of switch positions of the resistive load. Calculate the values of real power
3) Plot the V vs I curve
4) Plot the P vs I curve

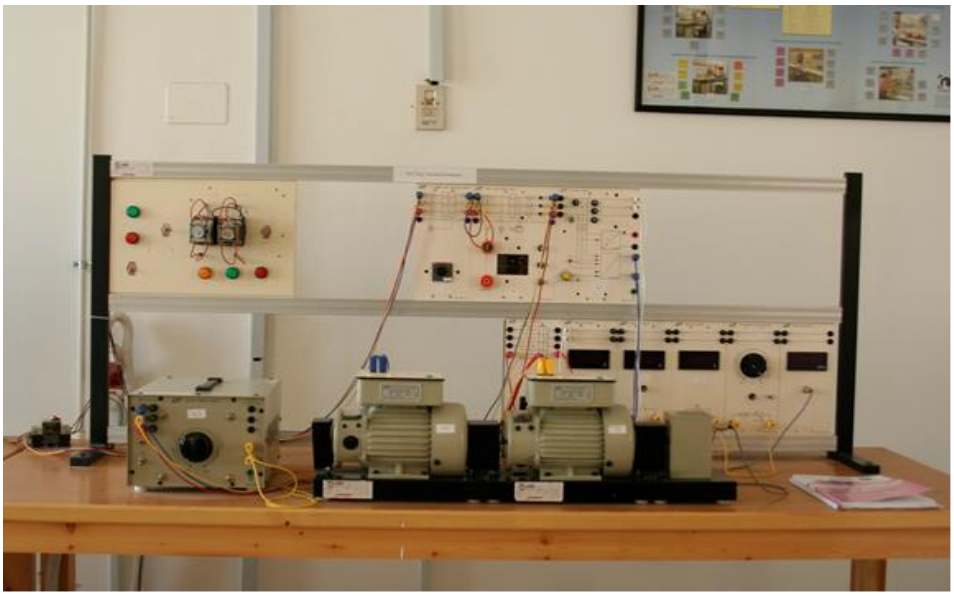
Inductive load

1) Record the voltage and current values for each of switch position of the inductive load Module
2) Plot the V vs I curve
3) Plot the P vs I curve

Capacitive load

1) Record the voltage and current values for each of switch position of the inductive load Module
2) Plot the V vs I curve
3) Plot the P vs I curve

EXP. (4) DC Shunt generator



1. Objective

Experiment explains the characteristics of Dc Shunt generator.

2. Components

- 1.DC Permanent magnet machine 0.4 KW
- DC shunt wound machine.
- Current limit protection switch 2A
- 3 – Ph power supply 10A
- 4 pole switches
- DC power supply.
- 7.Two DC A Meter 10A.
- Two DC V Meter 600V.
- DC generator load resistor 2A (1K Ohm/ 300W).
- Digital RPM Meter.
- Taco generator.
- DC generator Field Regulator 0.2A (2.2Kohm/50w).

3.Procedures

No load

1) Sequentially turn on the three pole current limit protection switch, Three phase power supply, and DC power supply Modules.
2) Press the start button on the DC power supply Module
3) Slowly turn the V.adj knob on DC power supply Module so that the motor rotates at the rated speed
4) Turn the Ωknob on the DC generator field regulator and set the field current I_f to 0A.Record the values of the field current I_f and generator output voltage E_o
5) Plot the E_o vs I_f curve

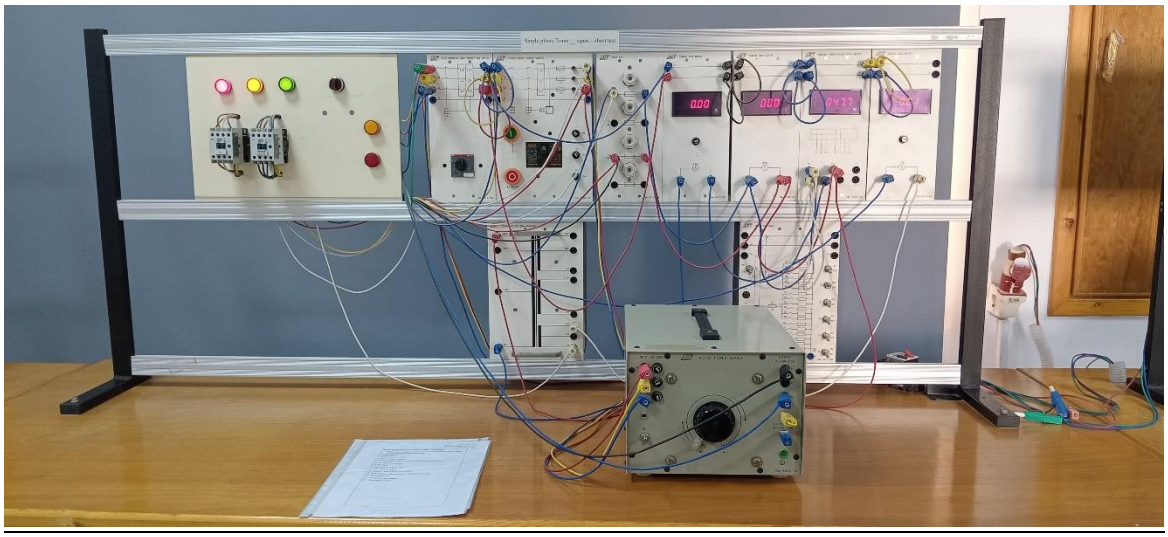
At Load

1) Sequentially turn on the three pole current limit protection switch, Three phase power supply, and DC power supply Modules.
2) Press the start button on the DC power supply Module
3) On the DC power supply Module, slowly turn the V.adj knob so that the motor rotates at the rated speed
4) On the DC generator Field regulator. Turn the Ωknob and set the field current to 0.1A. On the Dc generator load resistor, turn the Ωknob and set the armature current to 0.3A. Record the armature current, field current and generator output voltage values. Calculate the generator output current and the generator output power
5) Plot the E_o vs I_a curve
6) Plot the P_o vs I_a curve

EXP. (5) Single transformer – open – short test

1.Objective

The experiment explains the parameter of transformer due to open circuit test and short circuit test.



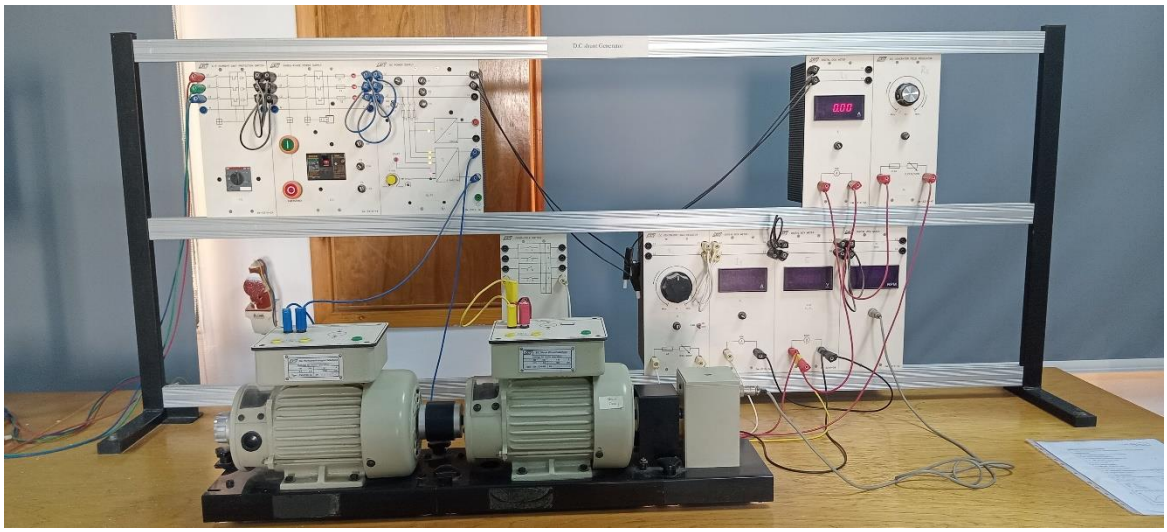
2.Components

- Open circuit switch.
- Short Circuit switch.
- Three phase current limit protection switch (4*2A)
- 3 – Ph power supply.
- Fuse test.
- Two DC A Meter 10A.
- DC V Meter 600V.
- Digital Three phase watt meter.
- Single phase transformer. (110v-80v-24v-12v)
- Resistive load.
- AC/DC power supply.
- Three phase 220V

EXP. (6) DC Compound Generator

1. Objective

The experiment illustrates the characteristics of Dc compound generator and studies the ability of smoothing control.



2. Components

- DC Permanent magnet machine. (220Vdc – 0.4 KW – 2.7A – 2500 RPM)
- DC Compound machine. (220 Vdc – 0.25 KW – 1.65A – 1800 RPM).
- Tach Generator.
- Three phase current limit protection switch(4*2A).
- 3 – Ph power supply.
- 3ph C.B (10 A).
- DC power supply. (Variable DC: 0 to 240V-10A).
- Two Digital DC A Meter 10A.
- DC generator Field Regulator 0.2A (2.2Kohm/50w).
- Digital power analysis meter. (RS.232)
- Digital RPM Meter.

- Digital DC V Meter. (600 V)
- Digital generator load resistor 2A. (1Kohm/300w).
- Four pole Switch.

3.Produce

- Sequentially turn on the 3-P current limit protection switch, three phase power supply, and DC power supply Modules.
- Press the start button on the DC power supply Module
- On the Dc power supply Module, slowly turn the v.adj knob to increase the motor voltage E until the motor rotates at of the rated speed
- On the DC Generator Field Regulator, turn the Ω knob and set the field current I_f to 0.1 A. On the DC Generator load resistor turn the Ω knob and set the armature current I_a to 0.3 A. Record the armature current, field current and generator output voltage E_o. Calculate the generator output current I_o and the generator output power P_o using the equation $I_o = I_a + I_f$, $P_o = I_o \times E_o$
- Plot the E_o vs I_a curve.
- Plot the P_o vs I_a curve.

EXP. (7) Digital L.C.R Meter (Model EDC1620)

1.Objective

The measuring of resistance, inductance and capacitance of low voltage cables and resistance of copper conductor.

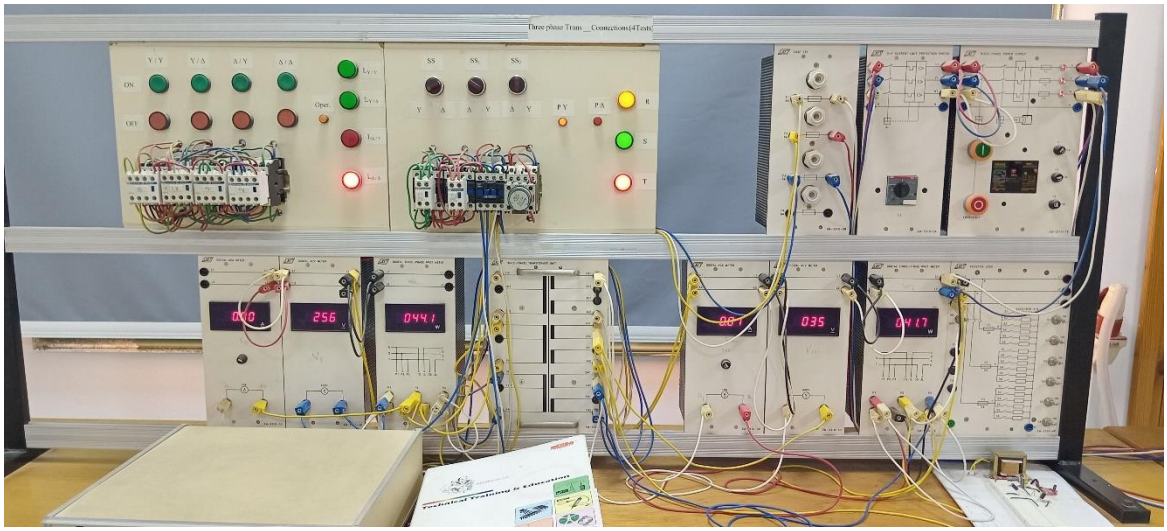
2. Components

- Measuring Resistance.
- Measuring Capacitance.

EXP. (8) Three phase transformer connection (4 Test)

1.Objective

The connections of winding coils in 3 ph. transformer are studied with the available and required to the required of loads.



2. Components

- Star – Delta connection panel.
- Delta – Star connection panel.
- Star – Star connection panel.
- Delta – Delta connection panel.
- Fuses unit test (6A).
- Three phase current limit protection switch(4*2A).
- 3 – Ph power supply.
- Two Digital DC A Meter (10A).
- Two Digital DC V Meter (600 V).
- Two Digital Three phase watt meter.
- Three phase Transformer unit.
- Resistive load. (920 ohm /30 KW * 18)

3.Produce

Wye-Wye connection

1) Install the required Modules in the Experimental Frame, The transformer is connected in wye-wye configuration
2) Sequentially turn on the 3-P current limit protection switch and three phase power supply Modules
3) With the power on, measure and record the voltage values using the digital ACV Meter

Wye-Delta connection

1) Reconstruct the circuit, The transformer is connected in wye-delta configuration
2) Sequentially turn on the 3-P current limit protection switch and three phase power supply Modules
3) With the power on, measure and record the voltage values using the digital ACV Meter

Delta-Wye connection

1) Reconstruct the circuit, The transformer is connected in delta-wye configuration
2) Sequentially turn on the 3-P current limit protection switch and three phase power supply Modules
3) With the power on, measure and record the voltage values using the digital ACV Meter

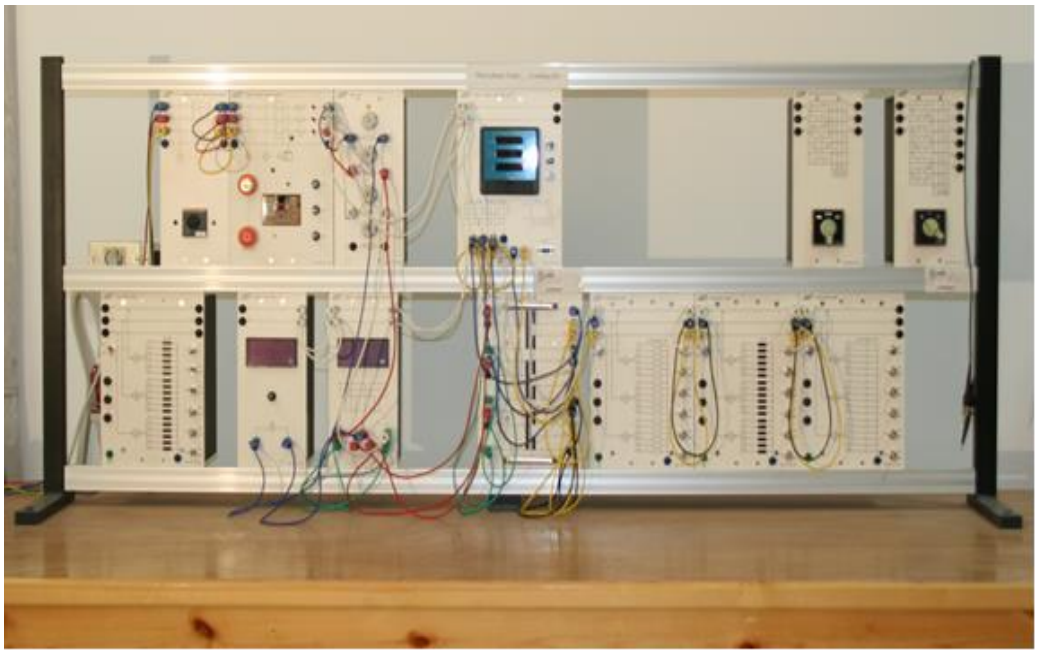
Delta-Delta connection

1) Reconstruct the circuit, The transformer is connected in delta-delta configuration
2) Sequentially turn on the 3-P current limit protection switch and three phase power supply Modules
3) With the power on, measure and record the voltage values using the digital ACV Meter

EXP. (9) Three phase transformer loading Characteristic.

1.Objective

Experiment discusses the characteristics of transformers due to the different type and sizing of loads.



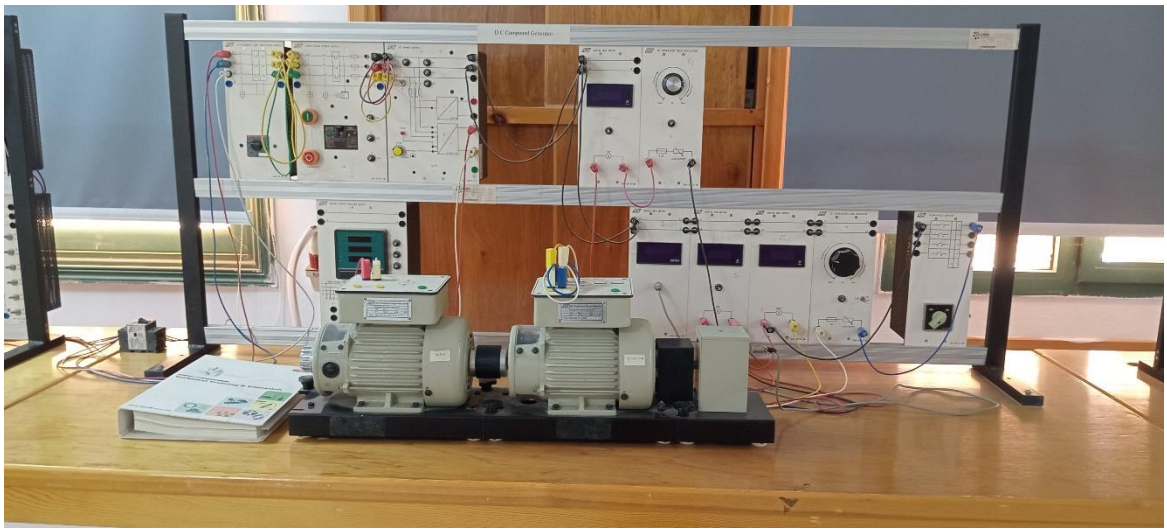
2.Components

- Three phase current limit protection switch (4*2A).
- 3 Ph power supply (10A).
- Digital power analysis meter.
- Digital DC A Meter (10A).
- Digital Three phase watt meter.
- Three phase transformer unit.
- Resistive load (920 ohm/ 300w*18).
- Induction load. (1.7H*18).
- Capacitive Load (2.5 Micro F/ 250V*18).

EXP. (10): Torque – Speed Characteristic of DC Compound

1.Objective

Complete analysis of DC compound of machines.



2. Components

- EM – 3320 – 1N Brake Controller.
- EM – 3320 – 1A Magnetic Powder brake unit.
- DC Compound wound machine (0.25KW – 1.65A)
- Three phase current limit protection switch(4*2A).
- 3 – Ph power supply (10A).
- DC Power Supply (0 to 240V).
- Two Digital DC A Meter (10A)
- Digital DC V Meter.
- DC Motor Field Regulator. (0.2A/2.2K ohm/50W)

3.Produce

1) Slowly turn the V.adj knob on the Dc power supply module to increase the motor voltage E up to the rated value of the Dc PM motor, 180 Vdc.
2) Record the values of the motor speed N, the motor current I (obtained from the digital DCA Meter), and the motor voltage E (obtained from the digital DCV Meter).
3) Plot the speed vs Torque curve
4) Plot the current vs Torque curve

6. 2 معمل آلات كهربية 3

❖ **اسم المقررات التى يخدمها المعمل**

- اختبارات كهربية (3).
- الات كهربية (3).
- الات كهربية (4).
- تحليل نظم القوي الكهربية (1).
- تحليل نظم القوي الكهربية (2).
- اختبارات كهربية (3).
- اختبارات كهربية (5).
- اختبارات كهربية (6).
- استخدامات الطاقة الكهربية.
- معالجة إشارات.
- ديناميكا النظم ومكونات التحكم.

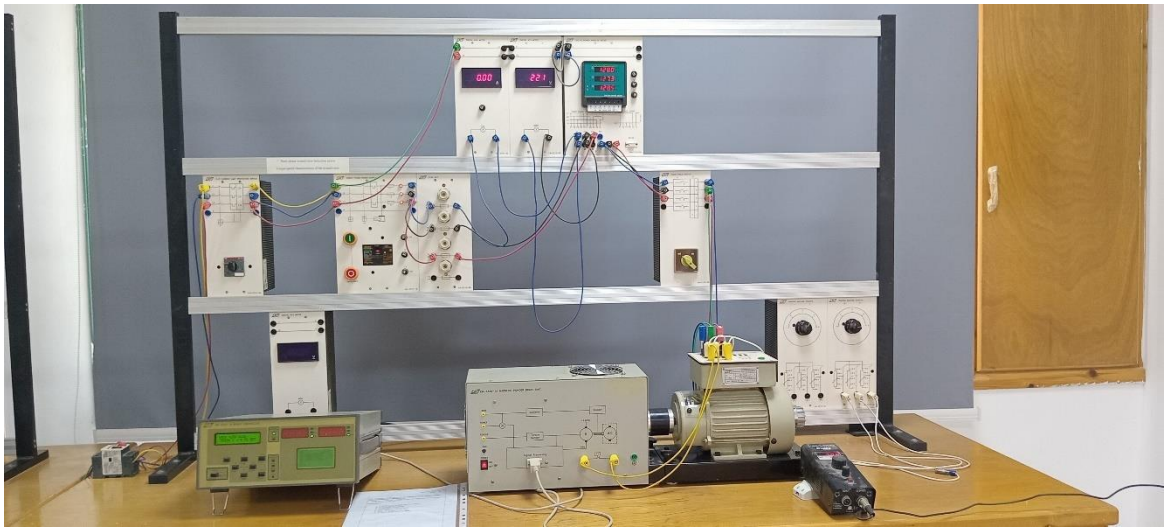
❖ **قائمة بالتجارب الموجودة بالمعمل**

1. Three – Phase Wound Rotor Induction Motor Torque – Speed Characteristics of The Wound Rotor.
2. Simulation of Automatic Control.
3. Three Phase Salient Poles Synchronous Generator – NO Load Characteristic.
4. Renewable Energy System using PV module.
5. Three Phase Salient Poles Synch. Motor (Load Characteristic).

EXP. (1) Three – Phase Wound Rotor Induction Motor Torque – Speed Characteristics of The Wound Rotor

1.Objective

Experiment helps the students in Draw the operated zone of Torque- speed Characteristic practical.



2.Components

- 3-Phase Current Limit Protection Switch.
- 3-Phase Power Supply.
- Two Digital ACV Meter.
- Digital ACA Meter.
- Digital Power Analysis Meter.
- Four – Pole Switch.
- Magnetic Powder Brake Unit.
- 3 – Phase Rotor Winding Motor.

EXP. (2) Simulation of Automatic Control

1.Objective

Experiment Simulation is operated in lab to detect the response of system

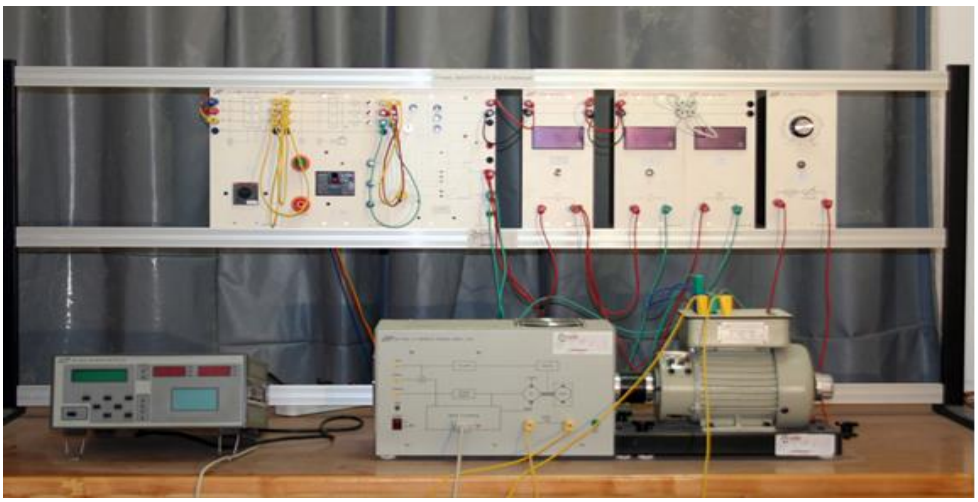
2.Components

- CRO Analyzer.
- P-Controller.
- i-Controller.
- D-Controller
- Sum of Amplifier.
- Analog power Driver.
- Dc Servo PWM Driver
- Inverting Amplifier
- Summing Junction.
- Testing Module.
- Amplifier.

EXP. (3) Three Phase Salient Poles Synchronous Generator – NO Load Characteristic

1.Objective

Open circuit test is applied to Salient Poles Synchronous Generator in these exp.



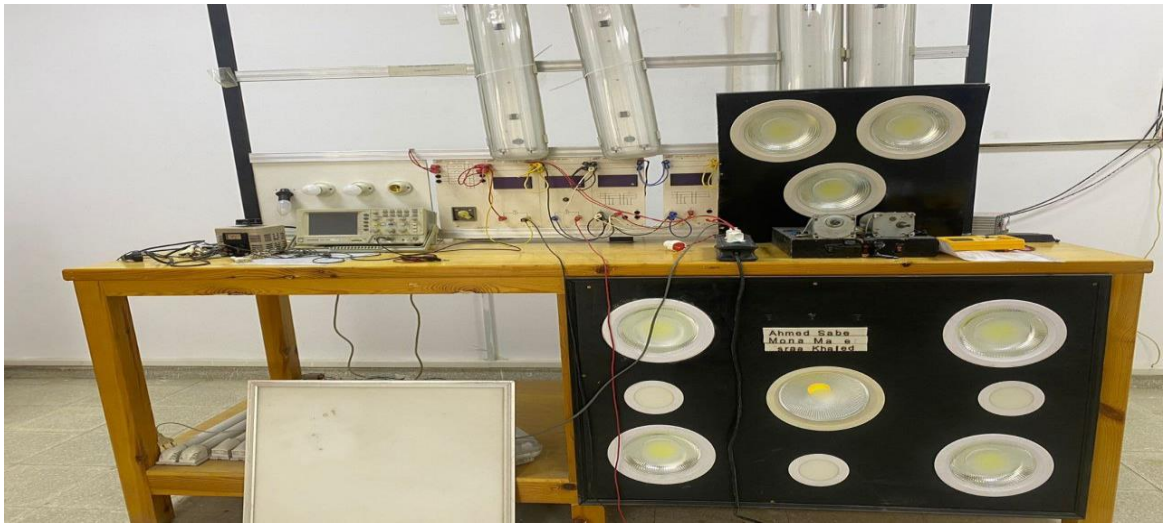
2.Components

- Digital RPM Meter.
- Two Digital DC V Meter.
- Digital AC V Meter.
- Digital AC A Meter.
- 3 – Phase Current Limit Protection Switch.
- 3 – Phase Power Supply.
- DC Power Supply.
- Synch. Machine Exciter.
- Two 4 – Pole Switch.
- DC Permanent Magnet Machine.
- 3 – Ph Salient Pole Synch. Machine.
- Digital Storage Oscilloscope.
- Controller.

EXP. (4) Renewable Energy System using PV module

1.Objective

A complete renewable energy system to create energy from 12V DC up to 220 V AC.



2.Components

- transformer (to convert from 220 v to 52v).
- Lamps.
- 1 K Watt Pure Sine Wave Inverter
- 12V 100Ah Battery.

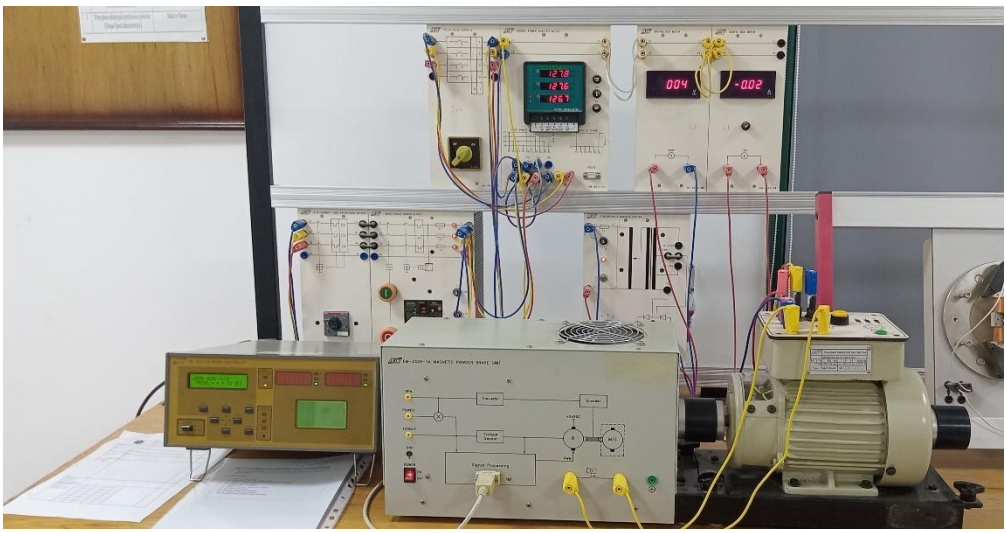
3.Porcedure

- Construct the diagram of (off grade) witch contain of PV cell +battery + pure sin wave 12 v ac to 220v ac inverter + dc controller.
- Connect the transformer to the led lamp to convert from 220 v to 52v.
- power the diagram.

EXP. (5) Three Phase Salient Poles Synch. Motor (Load Characteristic)

1.Objective

The effect of loading on Salient Poles Synch. Motor Is illustrated with experiment.



2.Components

- Brake Controller.
- Magnetic Powder Brake Unit.
- Three – Phase Salient Pole Synch. Machine.
- Digital DC A Meter.
- Digital DC V Meter.
- Digital Power Analysis Meter.
- 4 – Pole Switch.
- Synch. Machine Exciter.
- 3 – Phase Power Supply.
- Current Limit Protection Switch.

6. 3 معمل آلات كهربية 4

❖ **اسم المقررات التى يخدمها المعمل**

- تحويل طاقة.
- الات كهربية (3).
- الات كهربية (4).
- تحليل نظم قوى كهربية (1).
- تحليل نظم قوى كهربية (2).
- اختبارات كهربية (3).
- اختبارات كهربية (5).
- اختبارات كهربية (6).

❖ **قائمة بالتجارب الموجودة بالمعمل**

1. Fractional Horsepower Machine (New Advanced Experiment)
2. Three – Phase (star-delta) Starting Using PLC Control Unit
3. ON Delay / OFF Delay
4. Three Phase Salient Poles Synchronous Generator Load Characteristic
5. 3-Phase Squirrel Cage Induction Motor
6. ELM Hand Cranked Heart Basic Machine Unit
7. ELM Hand Cranked Heart Basic Machine Unit

EXP. (1) Fractional Horsepower Machine (New Advanced Experiment)

A fractional horsepower motor is a type of motor that operates on alternating current (AC) or direct current (DC). These motors are particularly suited for use in compact electronics and basic consumer products due to their low power output. Even in larger systems like automobiles, they can keep functioning even if the main power source fails.

1. Objective

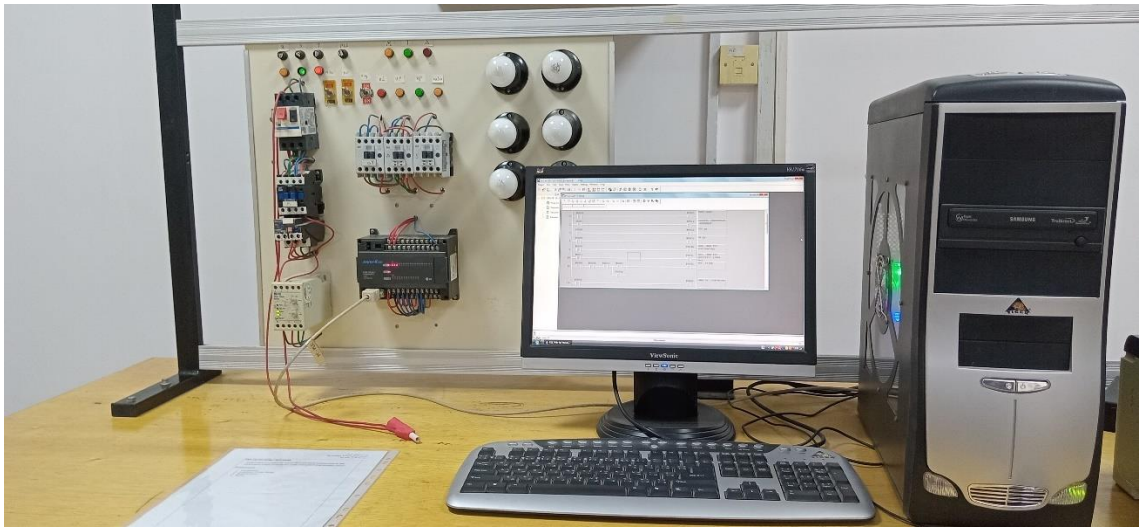
complete Analysis of different types of Machines is included in this experiment.

2. Components

- Digital Measuring Set Module.
- AC Three Phase Analyzer.
- DC Machine / Brake Genera trice Balance Dinamo Freno.
- Single Phase Capacitor.
- Variable Capacitive load.
- Power Supply Coffret D'Alimentation.
- Smart Power Quality Analyzer.
- Computer.
- Reluctance Motor.
- Shaded Poles Motor.
- USB Serial Adaptor.

EXP. (2) Three – Phase (star-delta) Starting Using PLC Control Unit

The Application of PLC in Simulation of Huge 3ph- square cage induction Motor starting based on Star Delta Starting Method.



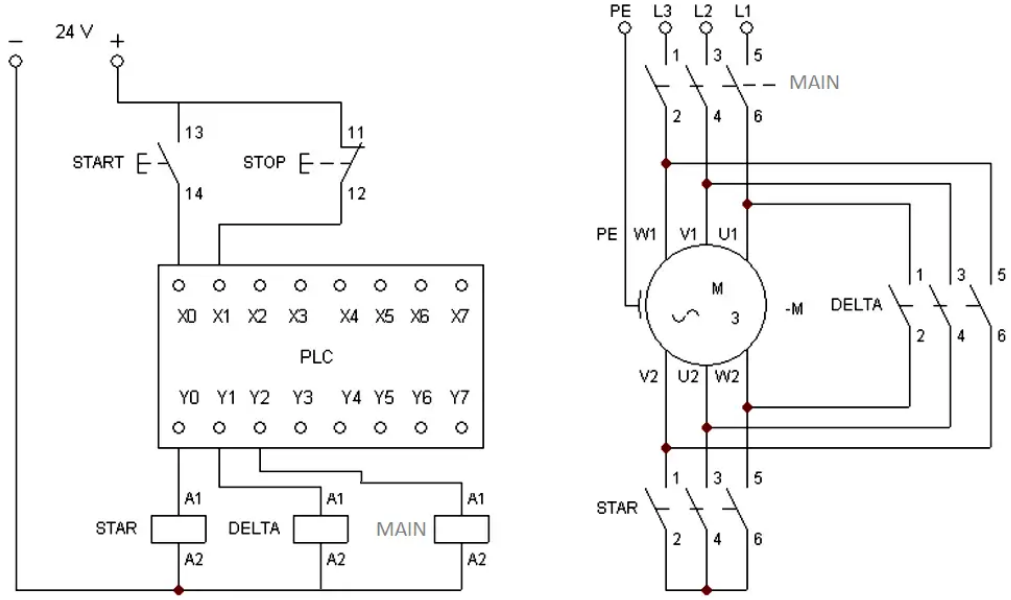
1. Objective

The main aim is to study and learn how to connect the 3Ph. Motor star/delta.

2. Components

- PCU Computer.
- PLC Controller.
- Contractors.
- Overload relay.
- Phase Failure relay
- Lamps (simulation Loads).

3. EXP. Diagram



4. Produce

→ During the working of the starter, two contactors remain closed. These two contactors are the main contractor and delta contactor.

→ The third contactor is star contactor and it's taking part only during the starting time of motor and carries star current when the motor is in star state.

→ The current in star state is 1/3 of the current in delta state. Hence contactor rating is one-third of motor rated current.

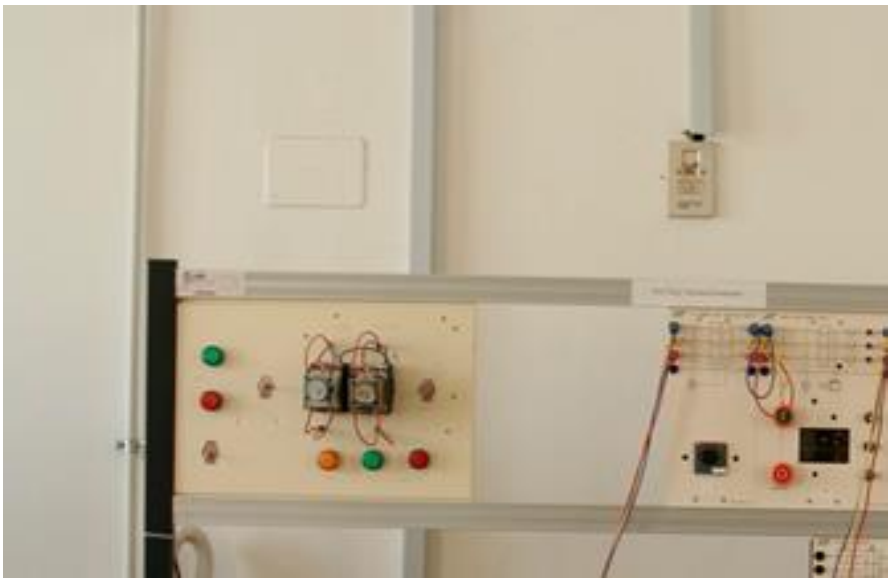
→ During starting the Main contactor KM3 and Star contactor KM1 are closed initially.

→ After some time, the timer in the circuit gets activated, it opens star contactor and closed delta contactor.

→ The switching of star state to delta state is done by using a timer, which connected in the wye-delta starter control circuit.

EXP. (3) ON Delay / OFF Delay

Time delay relays control circuits' activation after a set amount of time has passed. There are various time delay relays, each with specific uses. Some common applications for time delay relays include controlling the start and stop of machines, controlling the on and off cycling of a load, and delaying the activation of a circuit.



1. Objective

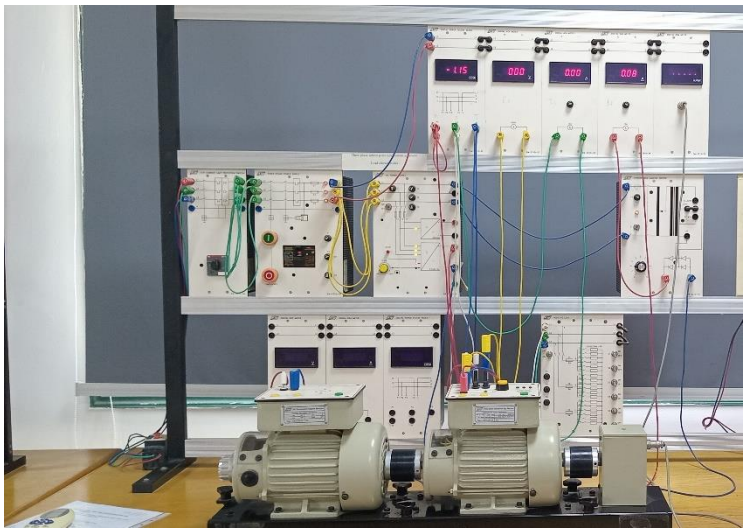
Experiment is a practical application of classic control to explain the response of on and off time delay relay.

2. Components

- Contractors.
- Auxiliary Timer Relay.
- Push buttons
- Wires.

EXP. (4) Three Phase Salient Poles Synchronous Generator Load Characteristic

Experiment helps the students in illustrating the effect of field current on the generation and electrical loads.



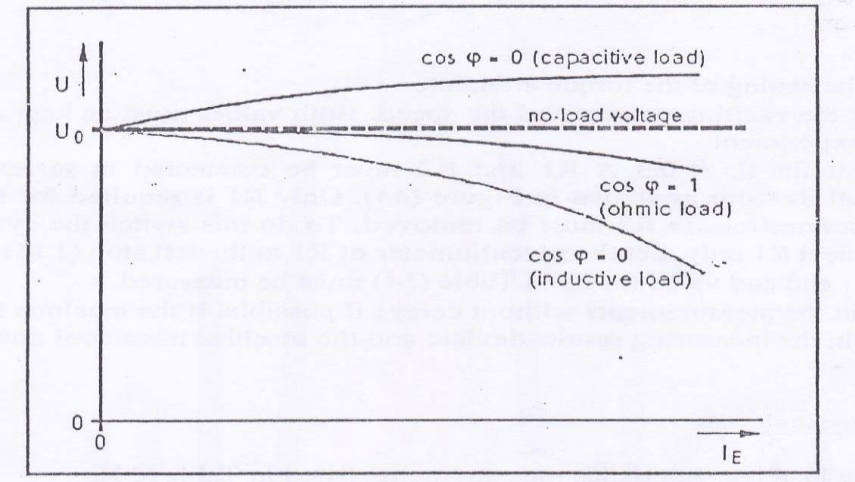
1. Objective

illustrating the effect of field current on the generation and electrical loads.

2. Components

- 3-Phase Current Limit Protection Switch.
- 3-Phase Power Supply.
- DC Power Supply.
- Two Digital Power Factor Meter.
- Resistive Load.
- Synchronous Machine Exciter.
- Two Digital DC V Meter.
- Digital RPM Meter.
- Digital ACA Meter.
- Digital AC V Meter.
- DC Permanent – Magnet Machine.
- Three – Phase Salient Pole Syn. Machine.

3. Exp. Diagram



4. Produce

→ connect the circuit shown in Figure.

→ Start up the system as already described in the previous experiment. The machine should rotate to the right (CW).

→ Set the speed to the rated speed (1500 rpm), and the exciting field current to (0.95. A).

→ Set the potentiometer of the load resistor (R1) to the left stop (1 KΩ).

→ Slowly decrease the load resistor to obtain the load current values listed in Table and measure the corresponding generated voltage (UL) and record both in the table.

→ To finish the experiment first switch (OFF) the Universal Power Supply and then the Control Unit.

EXP. (5) 3-Phase Squirrel Cage Induction Motor

How much does the speed of an induction motor drop as its shaft load increases? How much does the current and power of an induction motor increase as its shaft load increases? To find out the answers to these and similar questions, it is necessary to clearly understand the relationships among the motor's torque, speed, and power.as shown in this experiment.

1. Objective

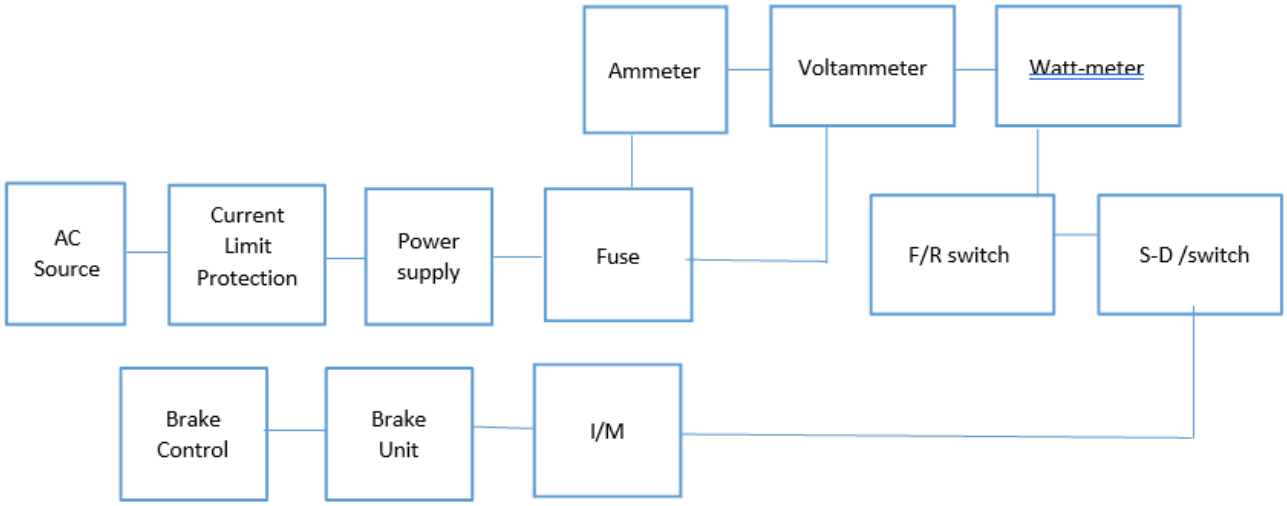
After completing this exercise, you should be able to demonstrate the Torque speed characteristic of squirrel cage induction motor.

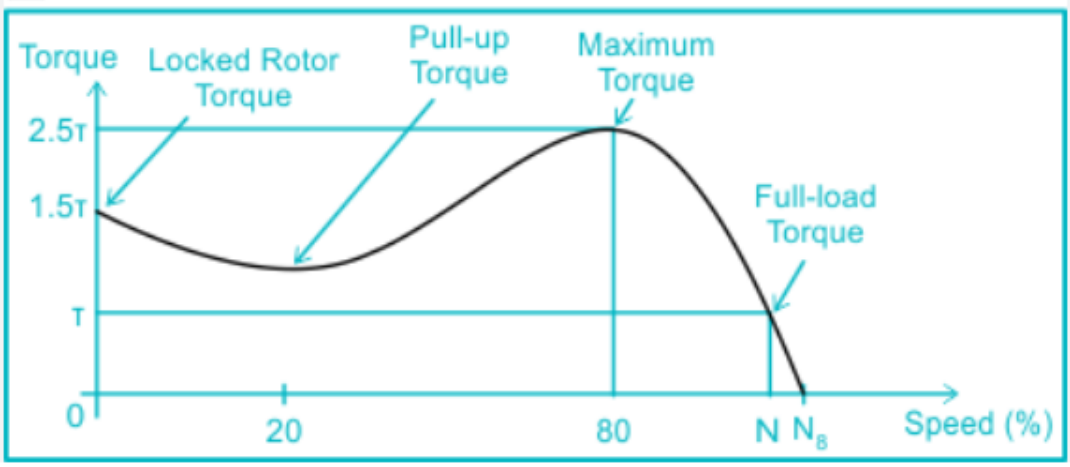
2. Components

- Brake Controller.
- Magnetic Powder Brake Unit.
- 3-Phase Squirrel Cage Motor.
- Three phase current limit protection switch(4*2A).
- 3 – Ph power supply.
- 3ph C.B (10 A).
- Two Digital DC V Meter.
- Three Digital ACA Meter (10A).
- Three Digital AC V Meter (10A).
- Two Digital Watt Meter.

- Forward and reverse 3pole Switch.
- Star Delta switch.
- Two Fuses unit test (6A).

3. EXP diagram





4. Produce

→ Connect the circuit.

→ Sequentially turn on the Brake Controller, Magnetic Powder Brake Unit, Three-phase Power Supply and 3-P Current Limit Protection Switch Modules.

→ The motor should start running in delta.

Manipulate the Brake Controller to operate in Mode (Closed Loop\Constant Torque)
mode and set the output torque to 0 kg-m.

→ Record the values of motor power P, motor current, power factor (obtained from the Digital Power Analysis Meter) and the motor speed N (obtained from the Brake Controller)

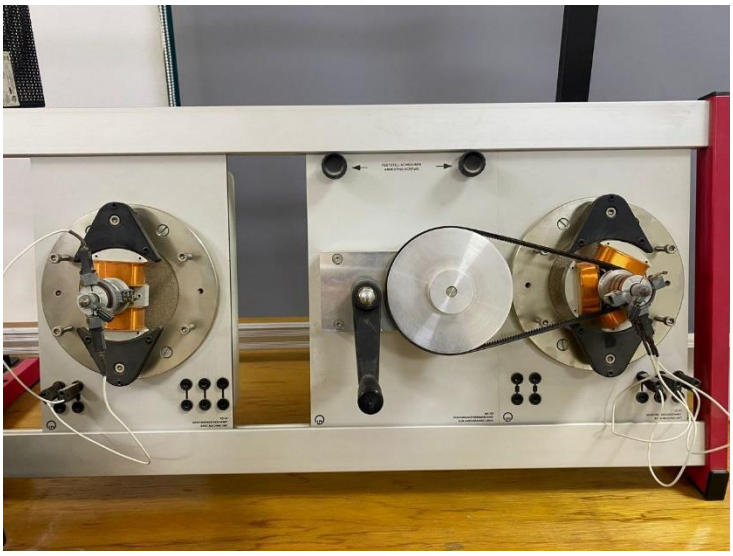
→ Recording the results in the table then constructing the curves.

→ Sequentially turn off the Three-phase Power Switch Modules, Magnetic Powder Brake Unit and Brake Controller. Supply, 3-P Current Limit Protection.

EXP. (6) ELM Hand Cranked Heart Basic Machine Unit

1. Objective

The basic construction of Electrical machine is explained in the experiment.



2. Components

- Cranked Heart Section.
- Basic Machine Section.
- Wiring Connection.
- Digital ACV Meter.
- Wires.

7. 4 معمل نظم القوى الكهربية

The power system lab comprises of protection, simulation, high voltage, and machine related. The experiments in the laboratory achieve many goals When faces an emergency fault.

❖ **اسم المقررات التى يخدمها المعمل**

- نقل وتوزيع الطاقة.
- تحكم آلي.
- اختبارات كهربية (4).
- تحليل نظم قوى كهربية (1).
- تحليل نظم قوى كهربية (2).

❖ **قائمة بالتجارب الموجودة بالمعمل**

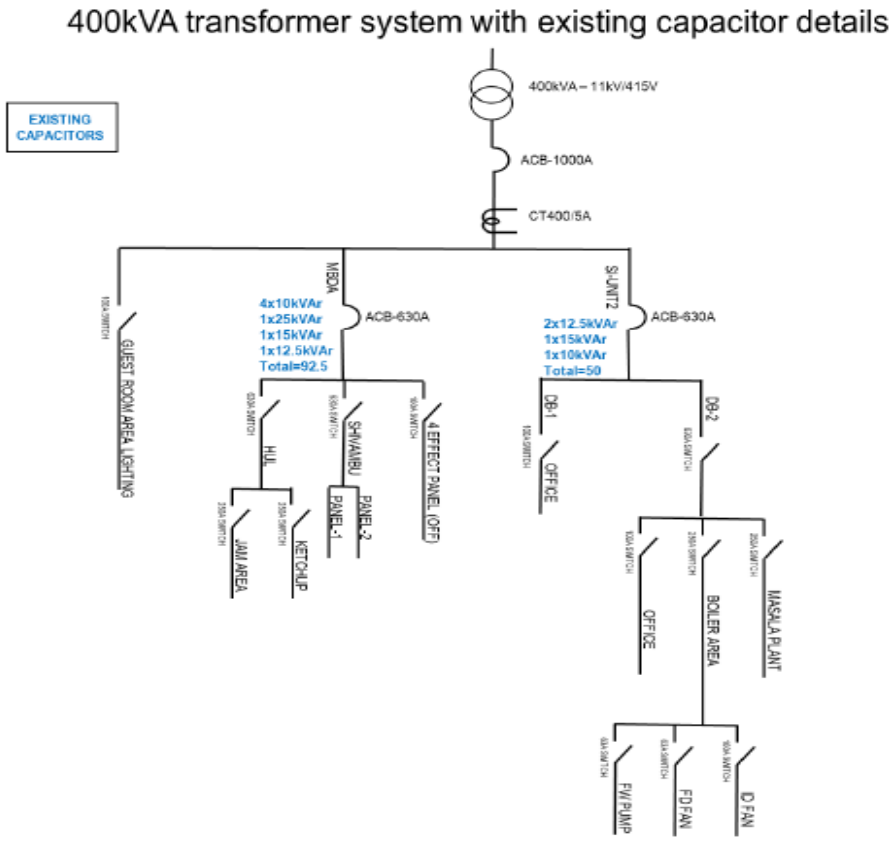
1. Power system panel protection against emergency Faults.
2. Under-Over current relay (Max. and Min. Relay).
3. Relay Kit of Electrical Power System.
4. Simulation of practical power system in ETAB Software.
5. Power Factor Correction of Inductive Load using Variable Static Capacitor.

Exp. (1) Power system panel protection against emergency Faults

1. Objective

Studying the emergency faults which may be occurred at the biller or the main busbar or the housing of 3ph Distribution Transformer.
Safety protection of human against unexpected faults without any accident using ELCB.

2. EXP diagram



3. Components

- ABB 25A In=30 mA ELCB. Fig (1)
- ABB 10A Emergency Feeder safety. Fig (2)
- ABB 10A In= Regulated ELCB. Fig (3)
- Earthing Rod of3ph Distribution Transformer.

- Earthing Rod of power system Pannel.
- ABB Surge module. Fig (4)

Fig (1)

Fig (2)

Fig (3)

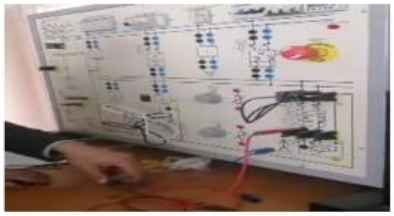


Fig (4)

1. Procedures

- Investigate the different types of protection Circuit braker and the suitable selection due to its application.

Type of Circuit Braker	Application
1. CB	Protect the connected Heavy load
2. MCB	Protect the connected Heavy load
3. ELCB	Protect the heart of human against the electric shock at emergency maintenance of electrical power system. [Nerve of human Heart is affected with(40-60mA)]
4. ELCB (Regulated)	Special Adjust of leakage current for ELCB

- Locate the ELCB and ELCB Regulated of EXP.
- To the practical single line diagram of simple Power System Distribution.

Exp. (2) Under-Over current relay (Max. and Min. Relay)

1. Objective

Explaining the importance of Under-Over Current relay in Electrical power system.

2. Components

- Analog **Under-Over current relay**
- Digital **Under-Over current relay**
- Variable External Resistance
- Three Digital Multimeter
- Connecting Wires
- Power supply 230 Volt

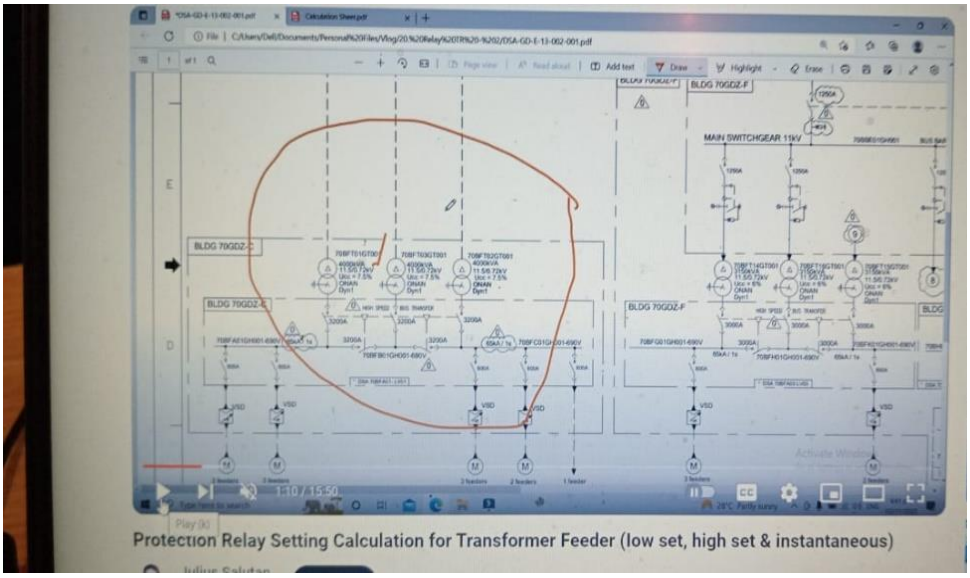
3. Procedures:

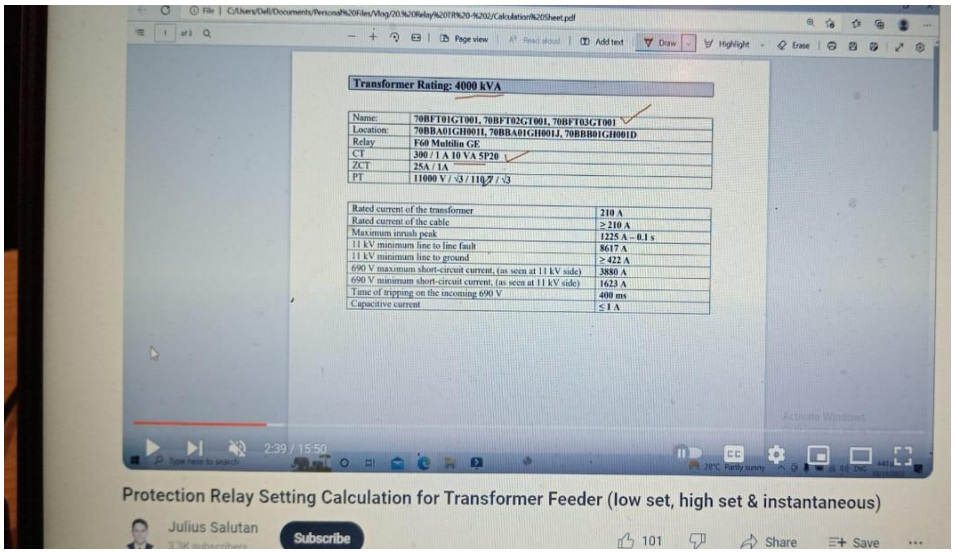
- Construct the series circuit of Supply with analog relay, digital relay and variable resistance to inject the current in the relays.

- Change the variable resistance to investigate the effect of
- changing the current under and above the range of 0.1A – 0.3A.

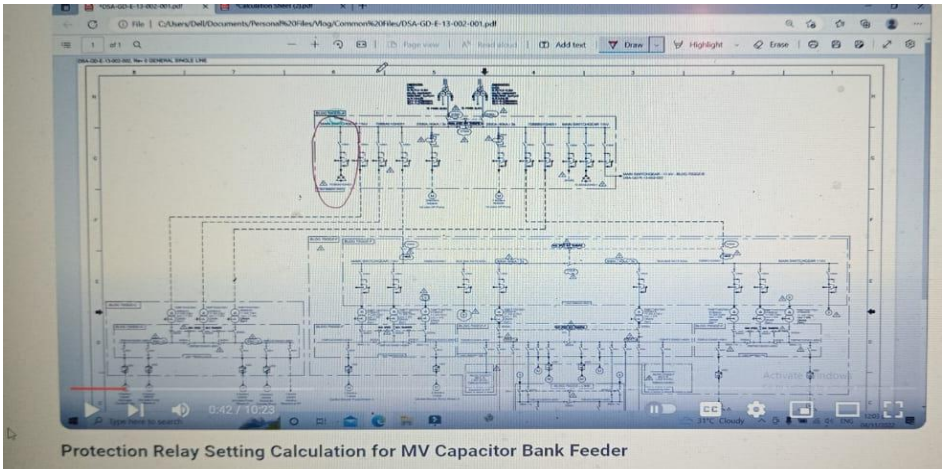
- Record the action of Auxiliary relay contact in the digital multimeter which is adjusted in Buzzer (ohm selection).
- Give Your opinion how Under-over current relay is used in electrical power system as following:

Example of the proposed relay on practical Distribution transformer

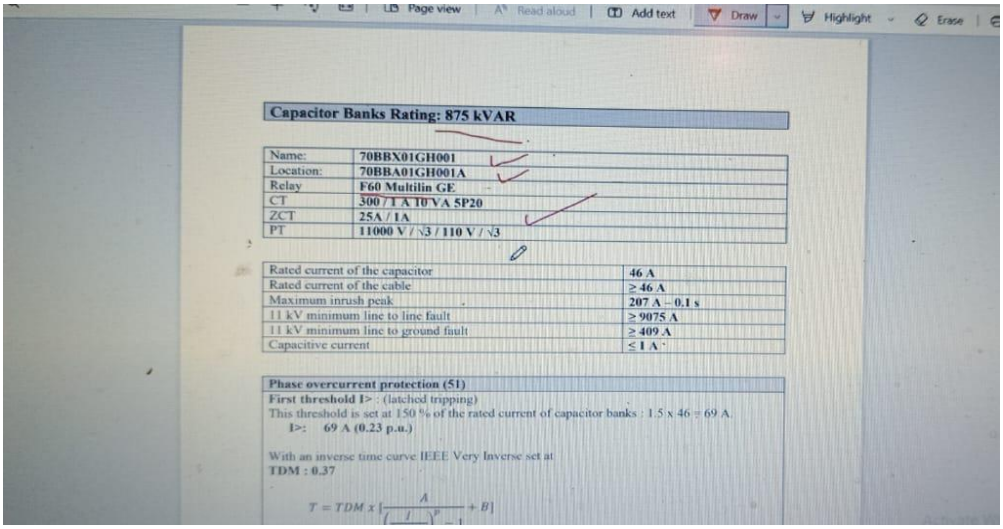




Example of the proposed relay on practical



capacitor bank of electrical power system.



Capacitor Banks Rating: 875 kVAR

Name:	70BBX01GH001
Location:	70BBA01GH001A
Relay	F60 Multilin GE
CT	300 / 1 A 10 VA 5P20
ZCT	25A / 1A
PT	11000 V / √3 / 110 V / √3

Rated current of the capacitor	46 A
Rated current of the cable	≥ 46 A
Maximum inrush peak	207 A – 0.1 s
11 kV minimum line to line fault	≥ 9075 A
11 kV minimum line to ground fault	≥ 409 A
Capacitive current	≤ 1 A

Phase overcurrent protection (51)

First threshold I> : (latched tripping)

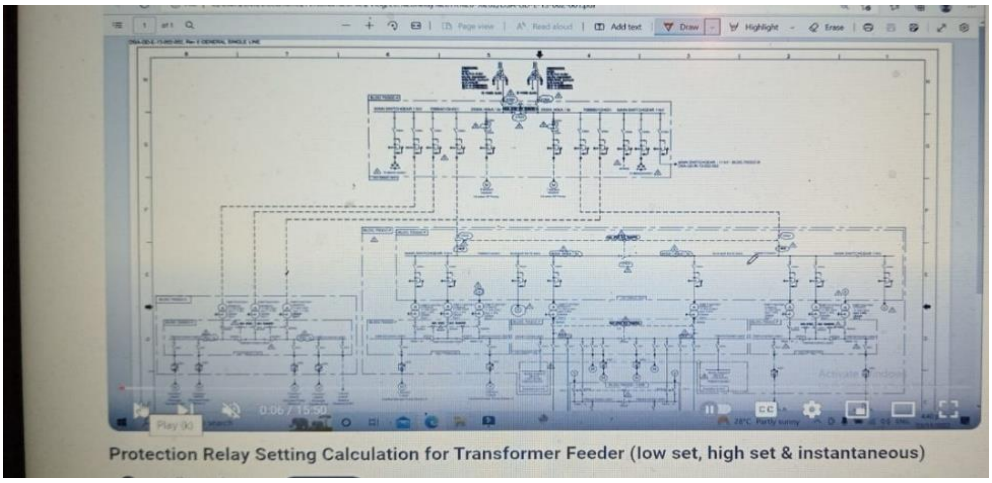
This threshold is set at 150 % of the rated current of capacitor banks : 1.5 x 46 = 69 A.

I>: 69 A (0.23 p.u.)

With an inverse time curve IEEE Very Inverse set at

TDM : 0.37

$$T = TDM \times \left[\frac{A}{\left(\frac{I}{I_P}\right)^p - 1} + B\right]$$



Exp. (3) Relay Kit of Electrical Power System

1. Objective

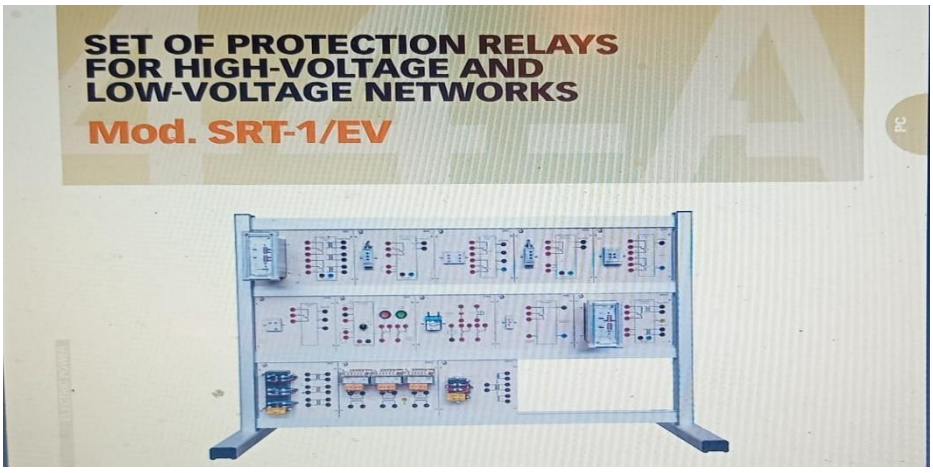
Illustrating the different relays which is used in electrical power system to detect the status of current and voltage at any location for achieve the stability voltage and continuity of feeding power.

2. Components

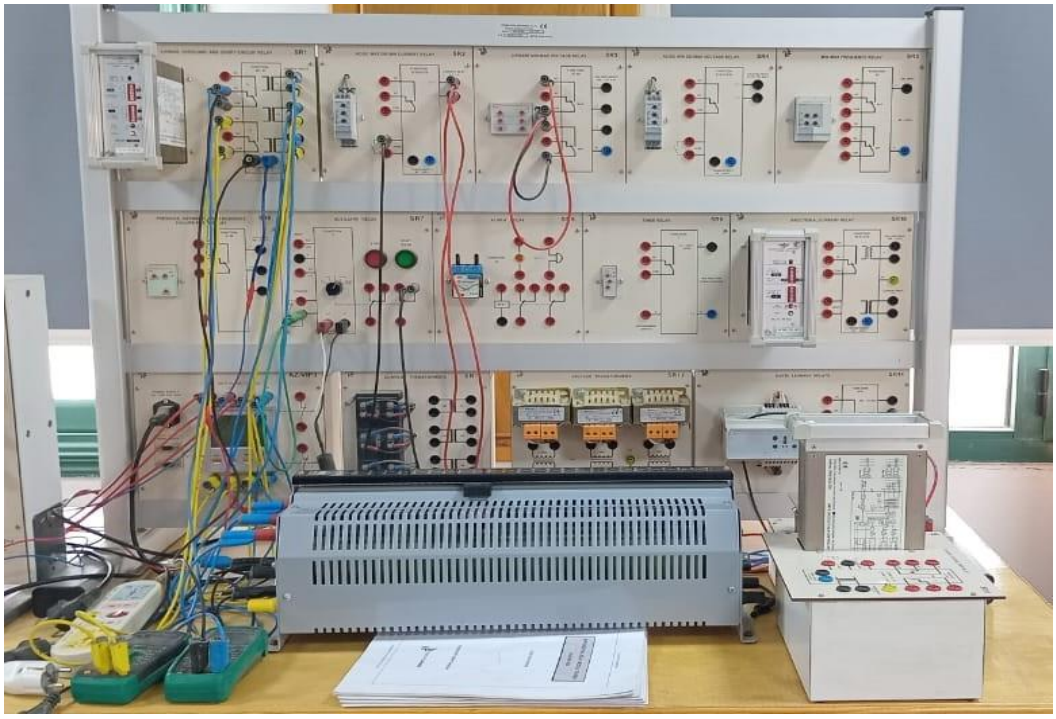
- 3 – PH Overload and short circuit relay.
- AC/DC Max. or Min. Current relay.
- 3 – PH Min. – Max. voltage relay.
- AC/DC Max. or Min. Voltage relay.
- Min. – Max. Frequency.
- Presence, Asymmetry and sequence Failure phase relay.
- Auxiliary relay.
- Alarm relay.
- Timer relay.
- Directional Current relay.
- Current Transformer.
- Voltage Transformer.
- Earth leakage relays.
- Power analyzer.
- Variable resistance (3 – phase).

3. Procedure

- Draw the circuit of Exp. in 2D (free hand). Of Figure



- Connect the different set of relays due to its application in electrical power network as for example overcurrent relay.



Exp. (4) Simulation of practical power system in ETAB Software

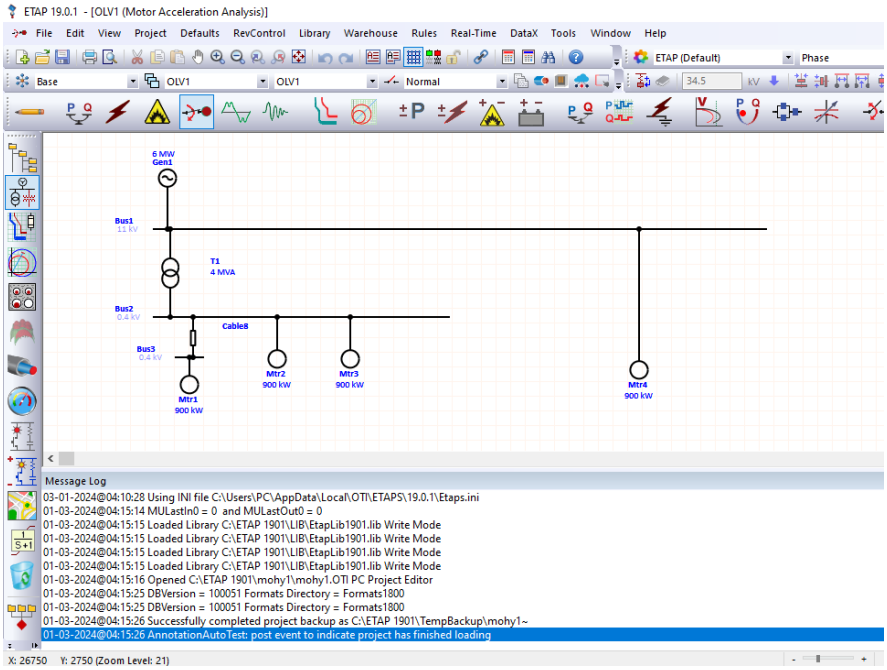
1. Objective

Drawing the single line diagram of practical power system and analysis of all events which effect on system as

1. power flow study.
2. Short circuit Analysis

2. Components

- Set up the software ETAB on your computer.
- Draw the single line diagram of practical power system.



Exp. (5) Power Factor Correction of Inductive Load using Variable Static Capacitor

1. Objective

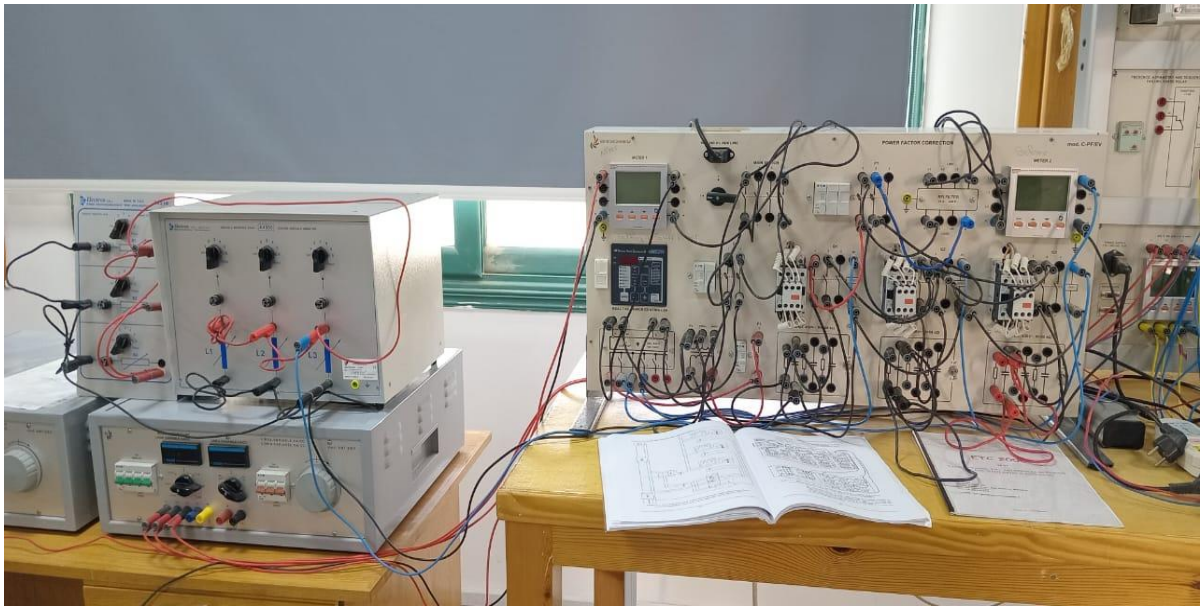
Studying the response of Adding the **Variable Static Capacitor** automatically according to the variation of practical inductive load to improve the power factor of electrical loads.

2. Equipment required:

- 3ph variable power supply
- 3ph square cage induction motor
- 3ph variable induction load
- Power factor correction automatic regulator

3. Procedure:

- Connect the 3ph power supply, 3-ph induction motor, inductive load and static variable capacitor in parallel combination.
- Record the value of power factor before and after correction.
- Comment on your results.



5.7 معمل المحكمات المنطقية والتحكم الالي (PLC)

❖ **اسم المقررات التى يخدمها المعمل**

- اختبارات كهربية (5).
- اختبارات كهربية (6).
- ديناميك النظم ومكونات التحكم.
- التحكم الالي.
- مجالات مغناطيسية.
- تحويل طاقة.
- التسيير الكهربي.
- إلكترونيات القوى (2).

❖ **قائمة بالتجارب الموجودة بالمعمل**

1. Simulation of Automatic Control (advanced).
2. Temperature control System.
3. pressure control System.
4. Flow control System.
5. Level control System.
6. speed control of Dc Motor using thyristors.
7. Control System of Washing machine using PLC.
8. Control System of starting 3-ph slip ring I. M using PLC.
9. Control System of Elevator using PLC.
10. Power transfer of transformer depend on magnetic core(advanced).
11. PLC Module to control the temperature.
12. PLC Module to control the position.
13. Position Control A/D technology.
14. DC Motor Controller.
15. AC Motor controller.
16. Analog Relay Test (Advanced).
17. Induction in a variable magnetic field (Advanced).
18. Induction in a variable magnetic field (Advanced).
19. Force in the magnetic field of electromagnetic (Advanced).
20. AC control circuit.

EXP. (1) Simulation of Automatic Control (advanced)

3. Objective

Experiment Simulation is operated in lab to detect the response of system.

4. Components

- CRO Analyzer.
- P-Controller
- i-Controller.
- D-Controller
- Sum of Amplifier.
- Analog power Driver.
- Dc Servo PWM Driver
- Inverting Amplifier.
- Summing Junction.
- Testing Module.
- Amplifier.

5. Procedure

- select the source.
- obtain basic observations from the source.
- transform the basic observations to input observations having known distributions.
- transform the input observations, via the model, to output observations.
- calculate statistics from the output observations to estimate the performance measures.

EXP. (2) Temperature control System

1. Objective

Helps control the temperature of industrial processes.

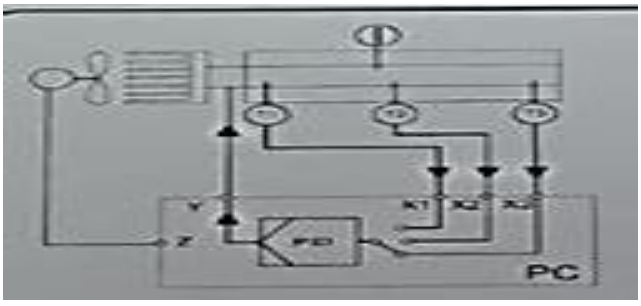
2. Components

- Training Temperature control unit.
- CPU computer.

3. Procedure

- Turn on the Temperature control unit.
- Simulate the program code on computer.
- Run the program code.

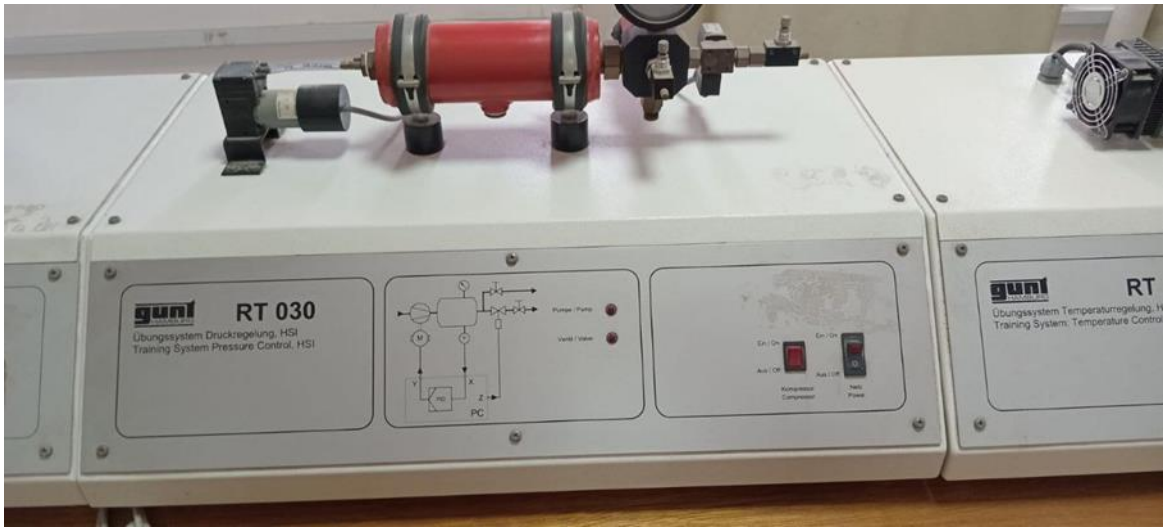
4. EXP diagram



EXP. (3) pressure control System

1. Objective

Control the amount of force produced by a fluid system.



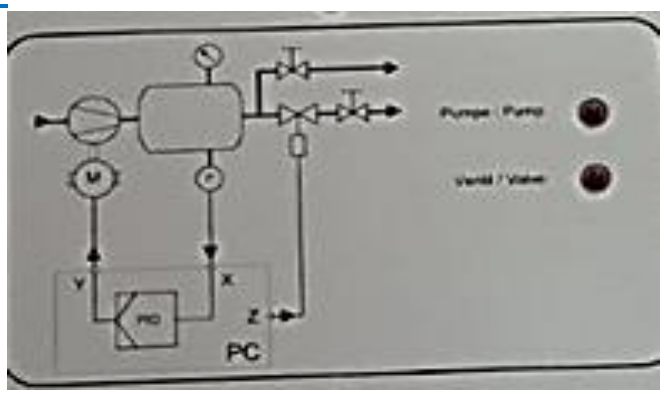
2. Components

- Training system pressure unit
- CPU computer

3. Procedure

- Turn on the pressure control unit.
- Simulate the program code on computer.
- Run the program code.

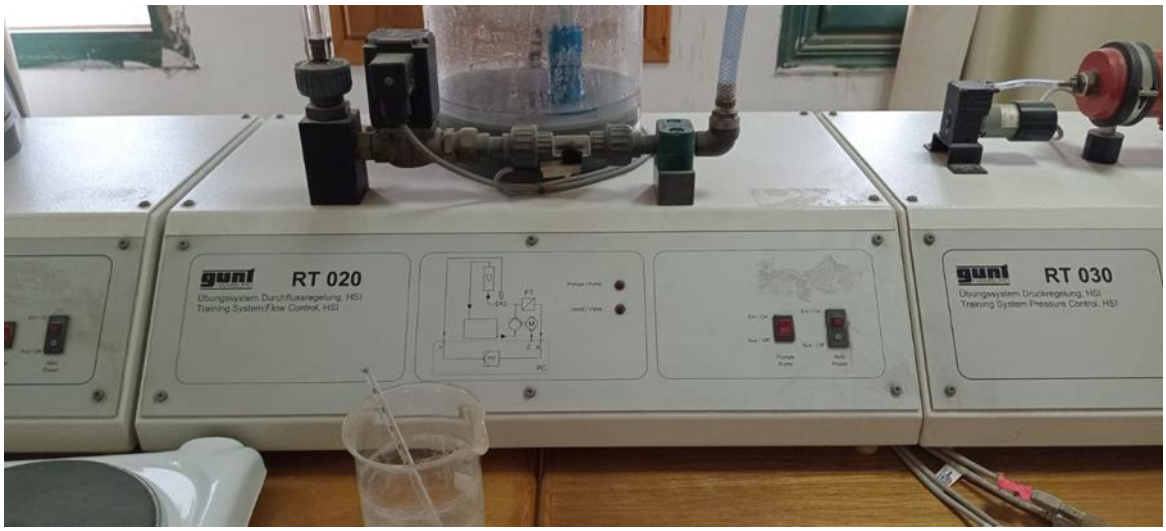
4. EXP diagram



EXP. (4) Flow control System

1. Objective

to ensure that fluids move through a system at the desired or intended rate in order to achieve optimal performance and efficiency.



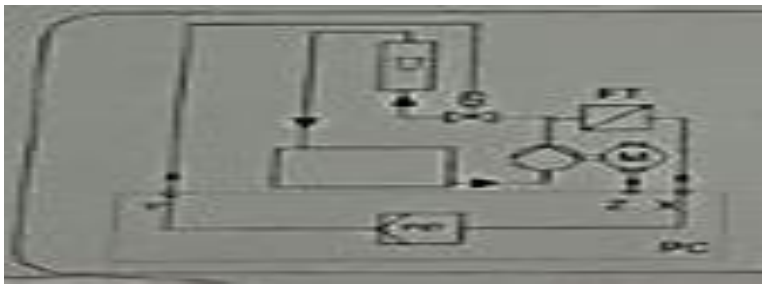
2.Components

- Training system flow unit
- CPU computer

3. Procedure

- Turn on the flow control unit.
- Simulate the program code on computer.
- Run the program code.

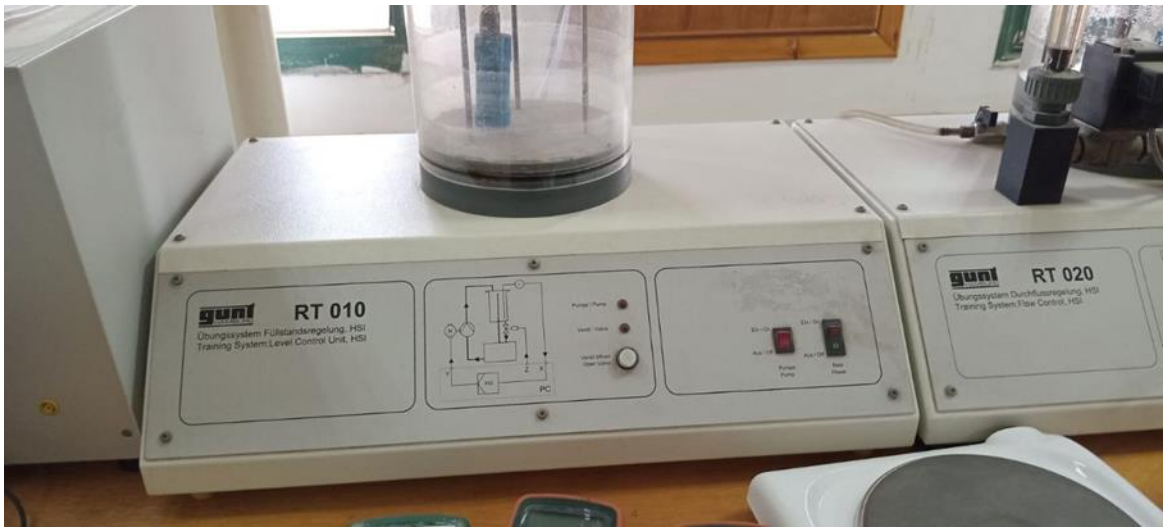
4. EXP diagram



EXP. (5) Level control System

1. Objective

to maintain containers holding liquids or liquid-like substances at a specific level.



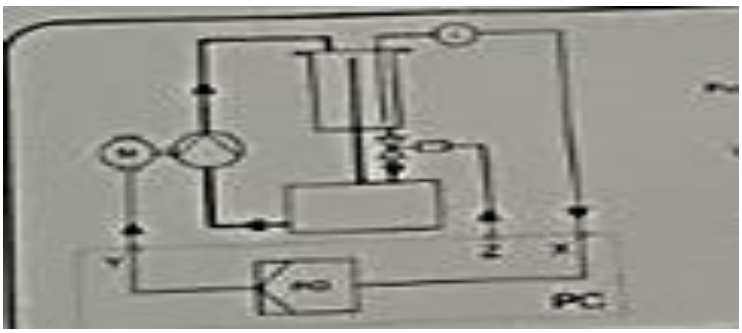
2. Components

- Training system level unit
- CPU computer

3. Procedure

- Turn on the level control unit.
- Simulate the program code on computer.
- Run the program code.

4. EXP diagram



EXP. (6) speed control of Dc Motor using thyristors

1. Objective

Start, Stop, Forward braking, reverse braking, increased and decreased speed of motor.

2. Components

- 1.DC Motor controller with thyristors.
- PC interface for motor devices.
- DC Shunt excitation machine.
- Digital Storage Oscilloscope.

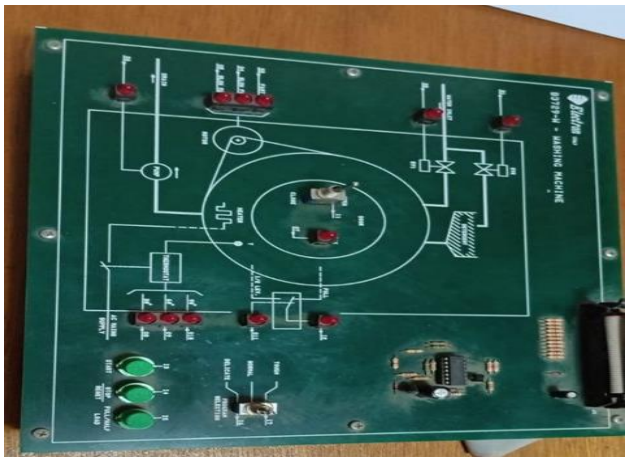
3. Procedure

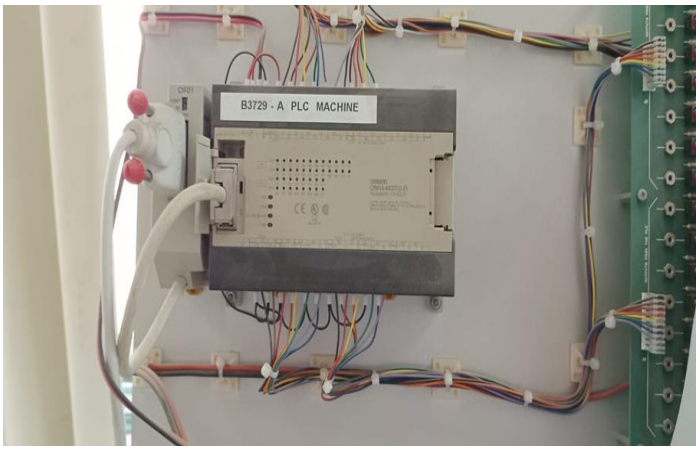
- connect the circuit as shown in the picture.
- power on the PC device.
- control the output on the Digital Storage Oscilloscope.

EXP. (7) Control System of Washing machine using PLC

1. Objective

Obtain the technique of automated washing device which washes clothes and sheets without any human intervention.





2.Components

- B3729-A PLC Machine.
- Connection and simulation panel.
- power contactors panel.
- AC power board.
- wires
- 5.Computer.

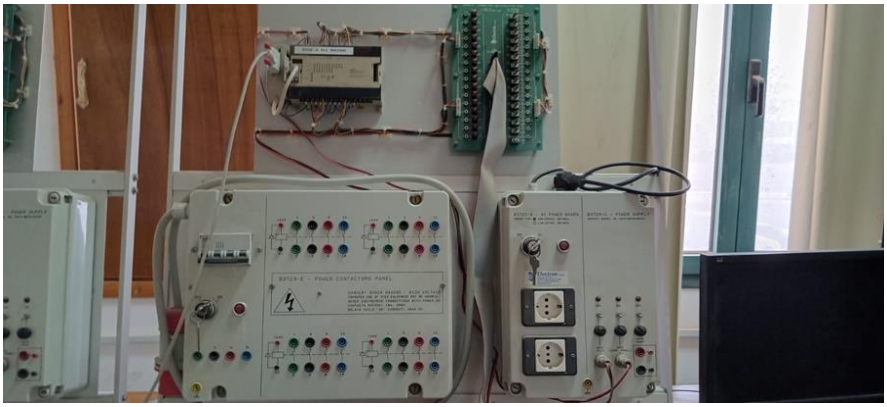
3. Procedure

- connect the system.
- simulate the panel.
- control the PLC Machine.
- turn on and control the panel to get the output.

EXP. (8) Control System of starting 3-ph slip ring I. M using PLC

1. Objective

reduces the starting current to a limit, but also develops High starting torque.



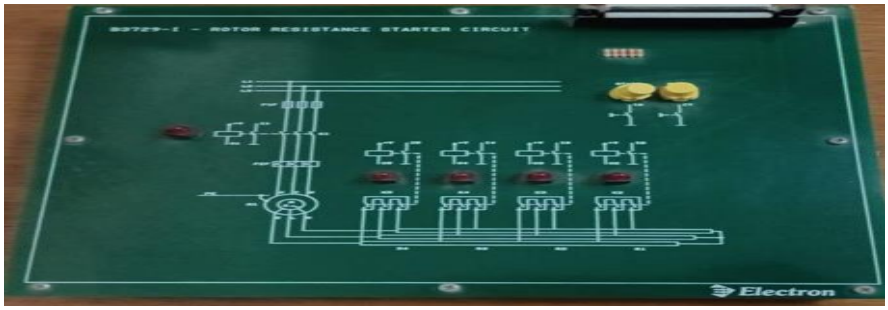
2.Components

- B3729-A PLC Machine.
- Connection and simulation panel.
- AC power board.
- power connection panel.
- Rotor resistance starter circuit.

3. Procedure

- connect the system.
- simulate the panel.
- control the PLC Machine.
- turn on and control the panel to get the output.

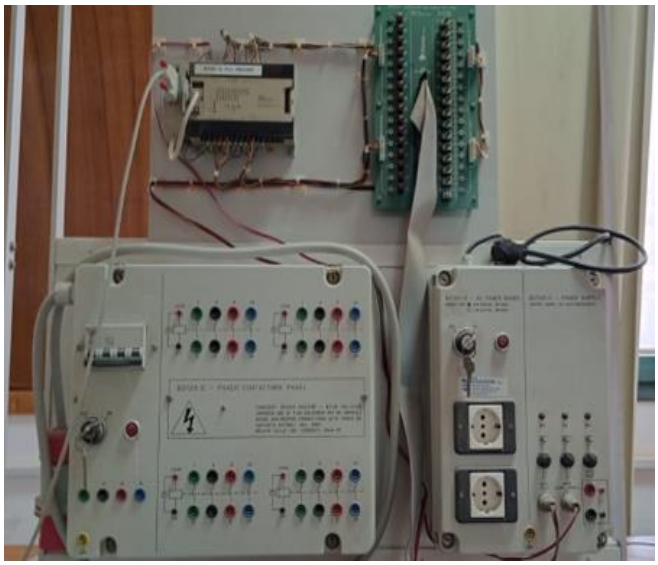
4. EXP diagram



EXP. (9) Control System of Elevator using PLC

1. Objective

Obtain the technique of Elevator using PLC.



2. Components

- 1.B3729-A PLC Machine.
- Connection and simulation panel.
- AC power board.
- power connection panel.
- Rotor resistance starter circuit.

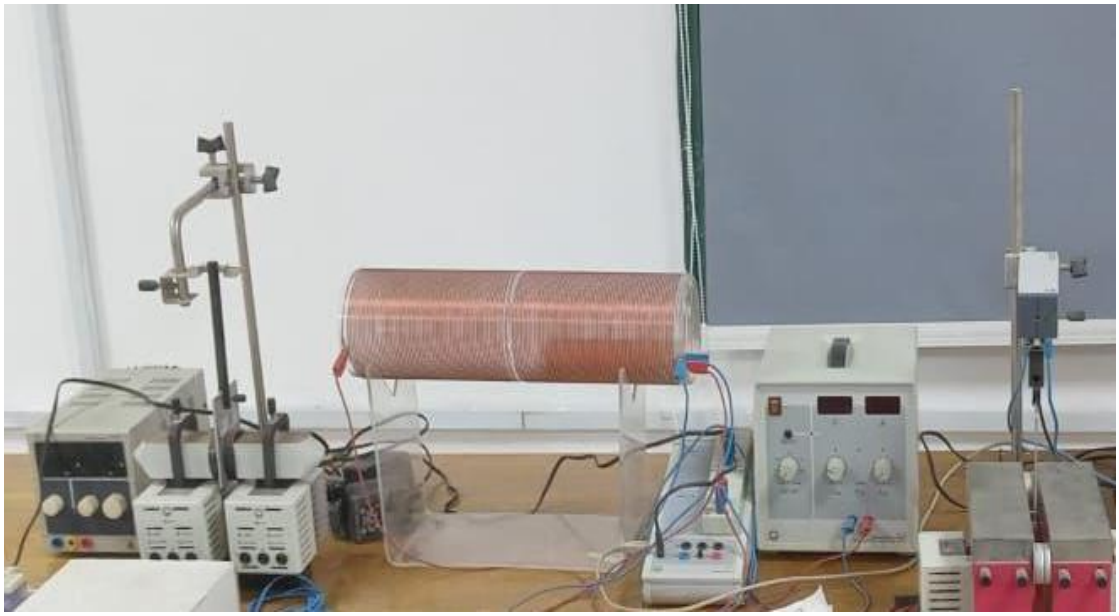
3. Procedure

- connect the system.
- simulate the panel.
- control the PLC Machine.
- turn on and control the panel to get the output.

EXP. (10) Power transfer of transformer depend on magnetic core(advanced)

1. Objective

Estimate the electric field charging.



2. Components

- AC source max 6A
- Primary coil r=0.6-ohm, N=250 and L=2.2 mH
- Secondary coil
- Magnetic Core

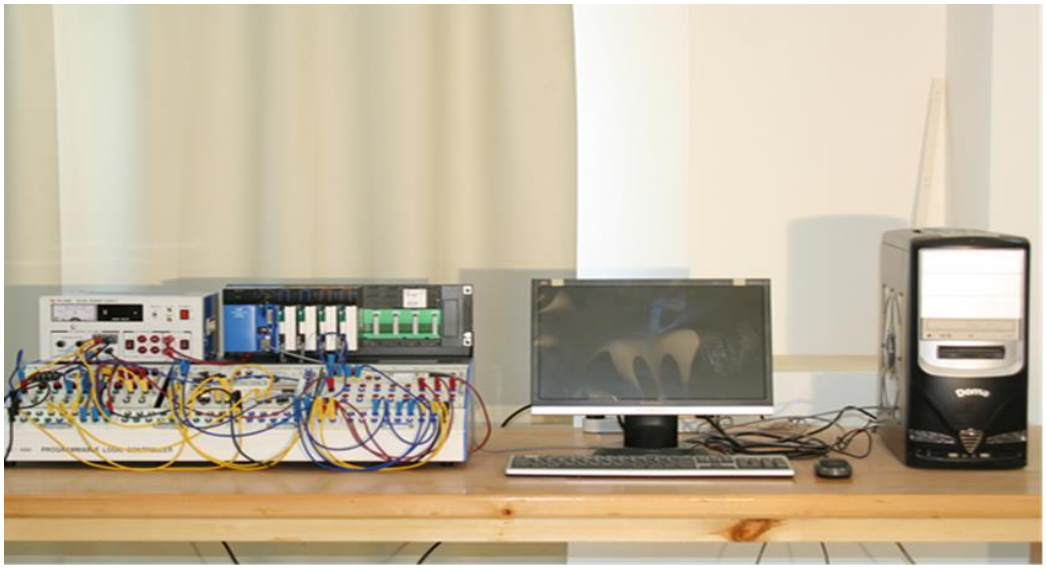
3. Procedure

- connect the circuit as shown in the picture.
- power on the ac source.
- estimate the output by controlling the two coils.

EXP. (11) PLC Module to control the temperature

1. Objective

Control the temperature.



2. Components

- ED – 4260 Programmable Logic Controller LS
- Wires
- CPU computers
- PS-4260 AC/DC power supply
- Temperature Modul

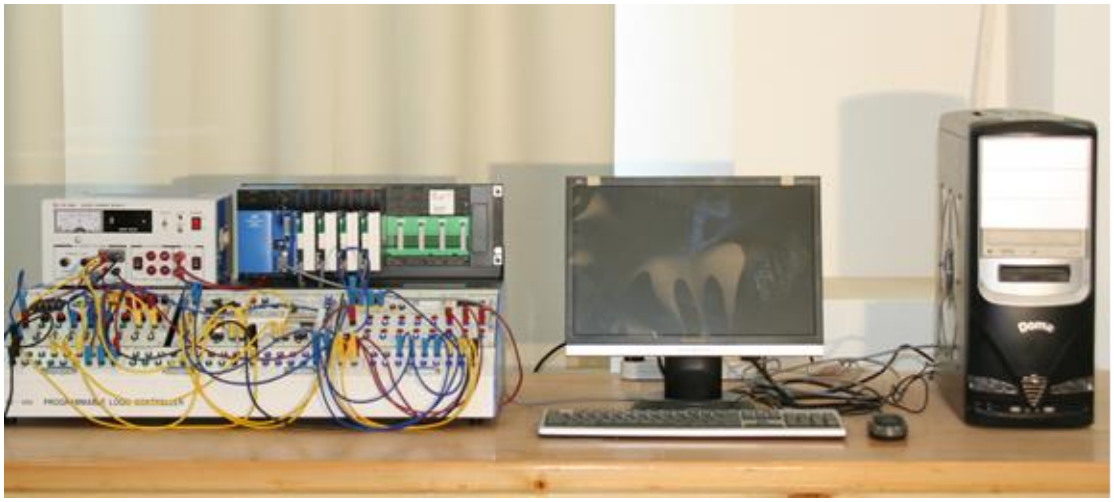
3. Procedure

- connect the circuit as shown in the picture.
- connect the device to the PC.
- simulate the program.
- control the output.

EXP. (12) PLC Module to control the position

1. Objective

Control the position.



2.Components

- ED – 4260 Programmable Logic Controller LS
- Wires
- CPU computers
- PS-4260 AC/DC power supply
- Temperature Modul

3.Procedure

- connect the circuit as shown in the picture.
- connect the device to the PC.
- simulate the program.
- control the output.

EXP. (13) Position Control A/D technology

1. Objective

Control and instrumentation.

2.Components

- Analogue unit 33-110 Feedback series
- Digital Unit 33-120 Feedback series
- Power supply 5V, 15V, - 15V, max 1.5 A
- position motor and its detector Control and instruction 33-100 Feedback series.
- Wires
- Oscilloscope
- USB to MICA8 Interface

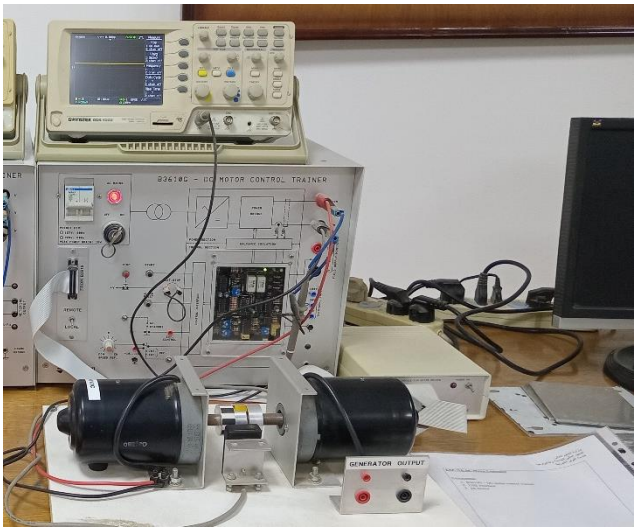
4. Procedure

- connect the circuit as shown.
- turn on the power supply.
- control the output.

EXP. (14) DC Motor Controller

1. Objective

controls the operation of a dc motor.



2.Components

- B3610G – DC motor control Trainer
- USB Interface
- Dc Motor

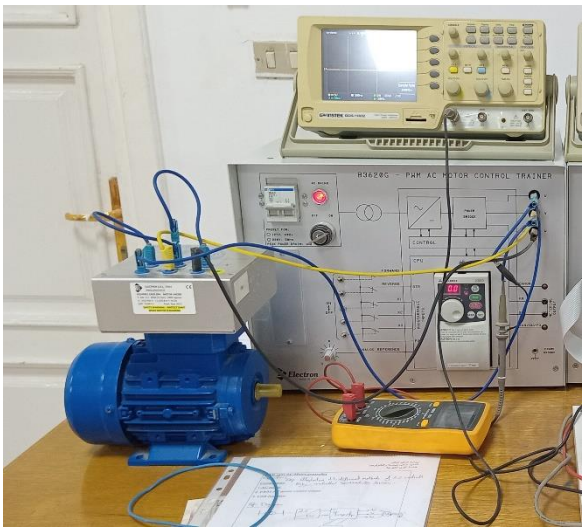
3.Procedure

- connect the circuit as shown.
- turn on the power supply.
- Control the output.

EXP. (15) AC Motor controller

1. Objective

Illustrates the different methods of AC controller using controlled semiconductor devices.



2.Components

- 1.AC motor
- PWM AC motor control trainer.
- USB Interface

3. Procedure

- turn on the supply of ac source.
- select the mode of variable ac drive and change the speed of motor and record the result on the sheet lab.
- select the mode from the driver control to adjust the firing of inverter at analog reference switch and record the result in lab sheet.
- Comment on lab sheet the benefit of exp.

EXP. (16) Analog Relay Test (Advanced)

1. Objective

The safe operation of power supply networks

2.Components

- Analog relay
- Variable Resistance
- Variable capacitance
- Variable inductance

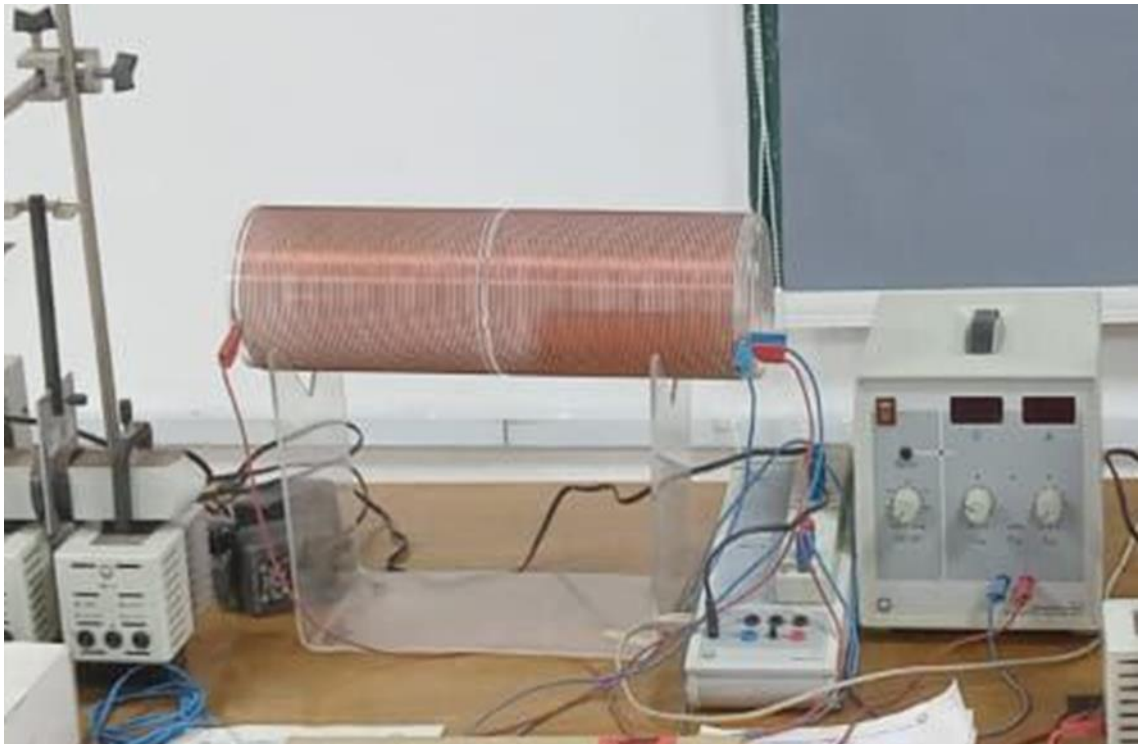
3.Procedure

- connect the circuit as shown.
- turn on the power supply.
- Control the output.

EXP. (17) Induction in a variable magnetic field (Advanced)

1.Objective

Estimate the electric field charging.



2.Components

- Large Air cylindrical coil
- Coils with different core shape
- Special supply with different settings of di/dt.
- Analog to digital Interface

3.Procedure

- connect the circuit as shown in the picture.
- power on the ac source.
- estimate the output by controlling the two coils.

EXP. (18) Induction in a variable magnetic field (Advanced)

1. Objective

Estimate the electric field charging.

2.Components

- Primary coil r=0.6-ohm, N=250 and L=2.2 mH
- Secondary coil r=0.6-ohm, N=250 and L=2.2 mH
- Special Magnetic Core

3.Procedure

- connect the circuit as shown in the picture.
- power on the ac source.
- Move the arm.
- estimate the output.

EXP. (19) Force in the magnetic field of electromagnetic (Advanced)

1. Objective

Produce the magnetic field.

2. Components

- Primary coil r=0.6-ohm, N=250 and L=2.2 mH
- Secondary coil r=0.6-ohm, N=250 and L=2.2 mH
- Special Magnetic Core
- Special supply with different settings of di/dt.
- U steal wire

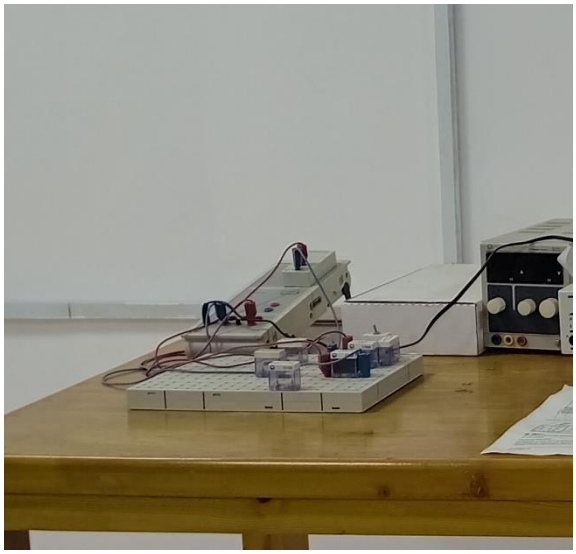
3.Procedure

- connect the circuit as shown in the picture.
- power on the ac source.
- Move the arm.
- estimate the output.

EXP. (20) AC control circuit

1. Objective

high power and long-distance transmission



2.Components

- Lamps
- Resistance
- Special supply with different settings of di/dt.

3.Procedure

- Connect the circuit.
- Power on the supply
- Control the output.

6 .7 معمل إلكترونيات القوى (1)،(2) (Power Electronics)

❖ **اسم المقررات التى يخدمها المعمل**

- نقل وتوزيع الطاقة.
- التحكم الآلي.
- اختبارات كهربية (6).
- الكترونيات القوى (1).
- الكترونيات القوى (2).

❖ **قائمة بالتجارب الموجودة بالمعمل**

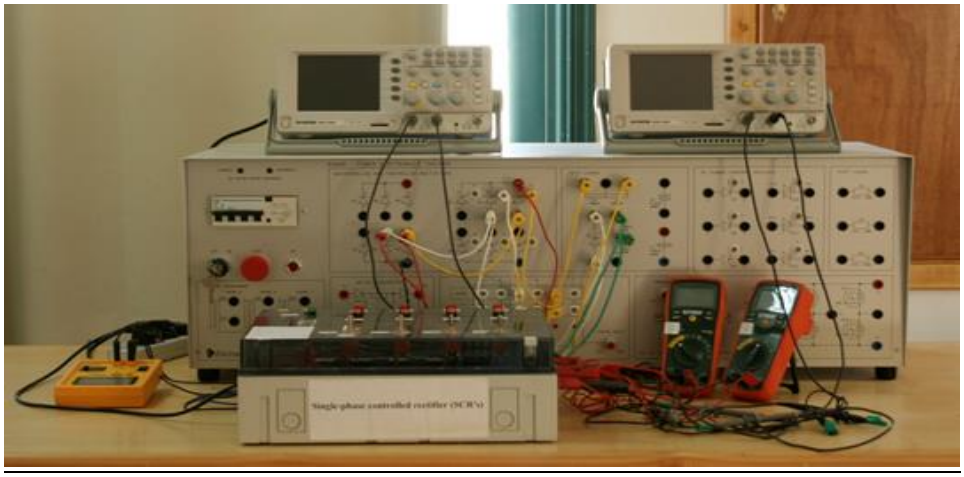
- Half wave phase control.
- Zener diode control.
- FET and MOSFET Control.
- Transistor Choker & Curve Tracer.
- UGT Characteristic.
- Function Generator 5MHZ.
- Half wave rectifier (Diode). (R/RL/RLF/RE/RLE).
- Half wave controlled (SCR). (R/RL/RLF/RE/RLE).
- Single phase rectifier (Diode).
- Single – phase Controlled rectifier (SCR).
- ED 5060M Console Motor Tacho.
- Spectrum Analysis of wave.
- Fluke Analyzer of AC signal.
- Transistor & UJT & SCR Characteristic.
- J – FET Characteristic / MOSFET Characteristic.

EXP. (1) Half wave phase control

1. Objective

Converts an AC signal to DC by passing either the negative or positive.

half-cycle of the waveform and blocking the other.



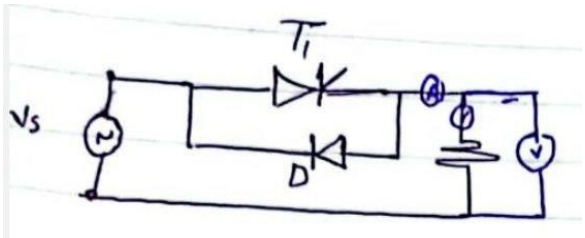
2.Components

- Module NO – 2304 SCR Characteristic (half wave phase control)
- Dual DC power supply.
- Wires.
- Five DC A Meter.
- Five DC V Meter.

3.Procedure

- Connect the circuit as shown.
- turn on AC voltage supply.
- connect fire angle c on thyristor
- recorded (A) and (v) reading
- draw voltage and current wave.

4. EXP diagram (R load)



Exp. (2) Zener diode control

1. Objective

- to measure the characteristic of Zener diode.
- to verify its application as voltage regulation.

2. Components

- Module NO – 2301A Diode and Zener diode Characteristic.
- Dual DC power supply
- Wires
- Five DC A Meter.
- Five DC V Meter.

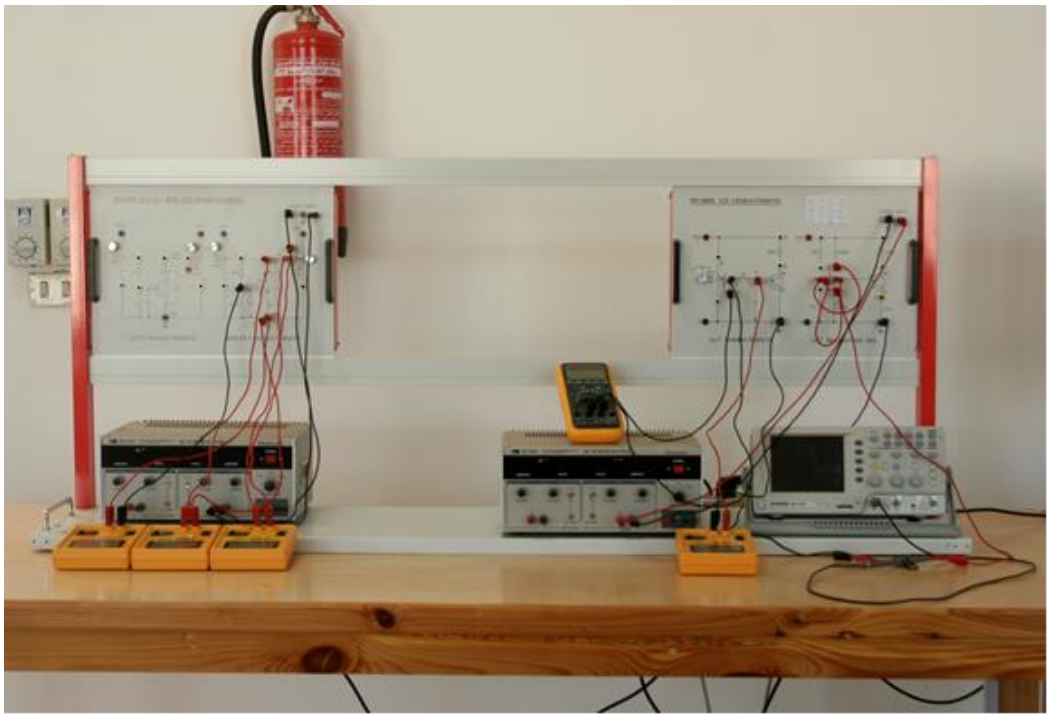
3. Procedure

- connect the circuit as shown.
- measure the value of ® in the opposite direction.
- power the supply until reach to (15v)
- check the potential of the Zener (forward- reverse).
- measure the value of ® and check the value of the voltage.
- record the values.

Exp. (3) FET and MOSFET Control

1. Objective

- to demonstrate the operation of a typical mosfet.
- to measure characteristics of mosfet.



2. Components

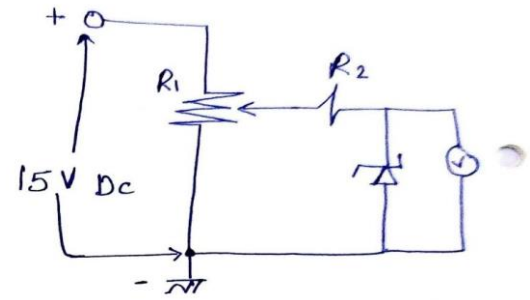
- Module NO – 2303A FET and Mosfet Characteristic.
- Dual DC power supply
- Wires
- Five DC A Meter.
- Five DC V Meter.

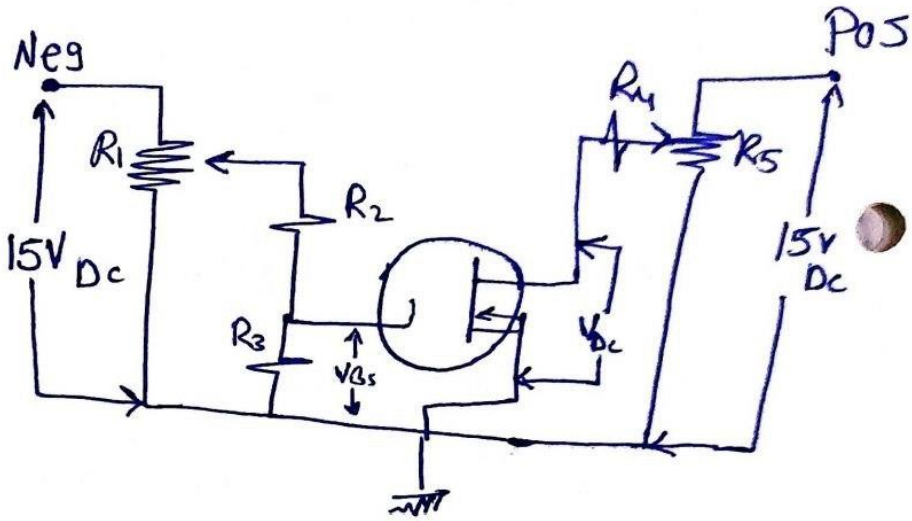
3.Procedure

- Connect the circuit as shown.
- Turn on the supply and transfer the potentiometer of (R1), (R2) counterclockwise.
- Transfer the potentiometer of (R5) until the voltage reaches (0.5 v) and (Vds=0).

- measure the value of the current and recoded it
- measure the voltage on (R4) to make (Vds)= 0.5v
- disconnect the supply and reverse the income.
- repeat the steps.

4. Connection circuit





EXP. (4) Transistor Choker & Curve Tracer

1. Objective

How you can test the transistor

2.Components

- Transistor Module
- Oscilloscope.
- Wires

3.Procedure

- connect the circuit.
- turn on the supply.
- control the circuit.

EXP. (5) UGT Characteristic

1.Objective

To switch and control both thyristors and triacs for AC power control.

type applications.

2.Components

- 1.NO – 2305A UJT Characteristic.
- Dual DC Power supply.
- Oscilloscope.
- Wires

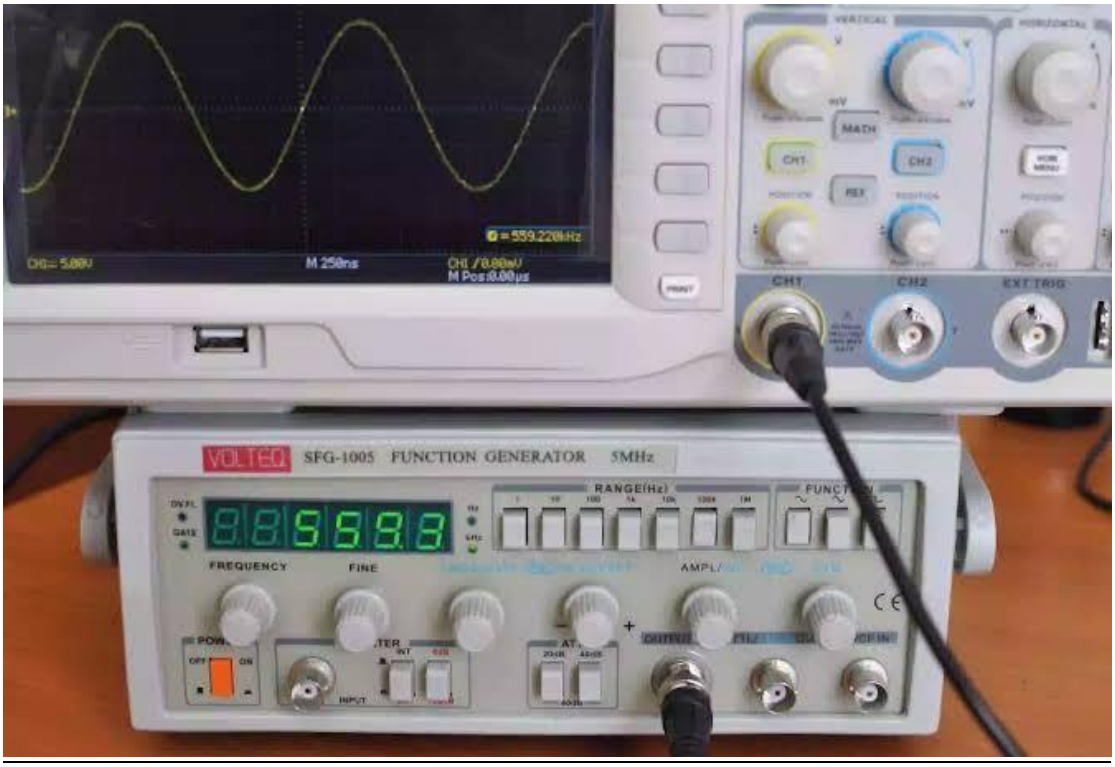
3.Procedure

- Connect the circuit as shown.
- turn on the power supply.
- measure the values of an Oscilloscope.

EXP. (7) Function Generator 5MHZ

1.Objective

To produce sine, square, and triangle waveforms.



2.Components

- 1.Two Oscilloscope.
- 2.Function generator 5 MHZ
- 3.Wires

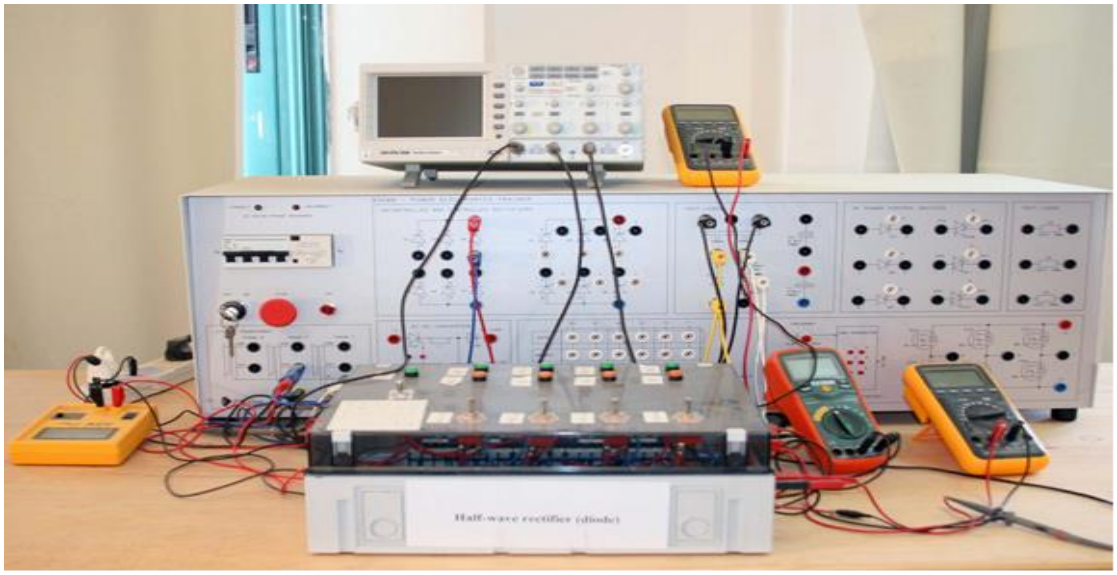
3.Procedure

- turn on the Function generator.
- measure the values
- obtain the wave on the Oscilloscope.

Exp. (8) Half wave rectifier (Diode). (R/RL/RLF/RE/RLE)

1.Objective

The effect of variable loads with Half wave rectifier bridge



2.Components

- Diode module of B3600 – Power Electronic trainer
- Wires
- Resistive load
- Inductive loads
- Wires

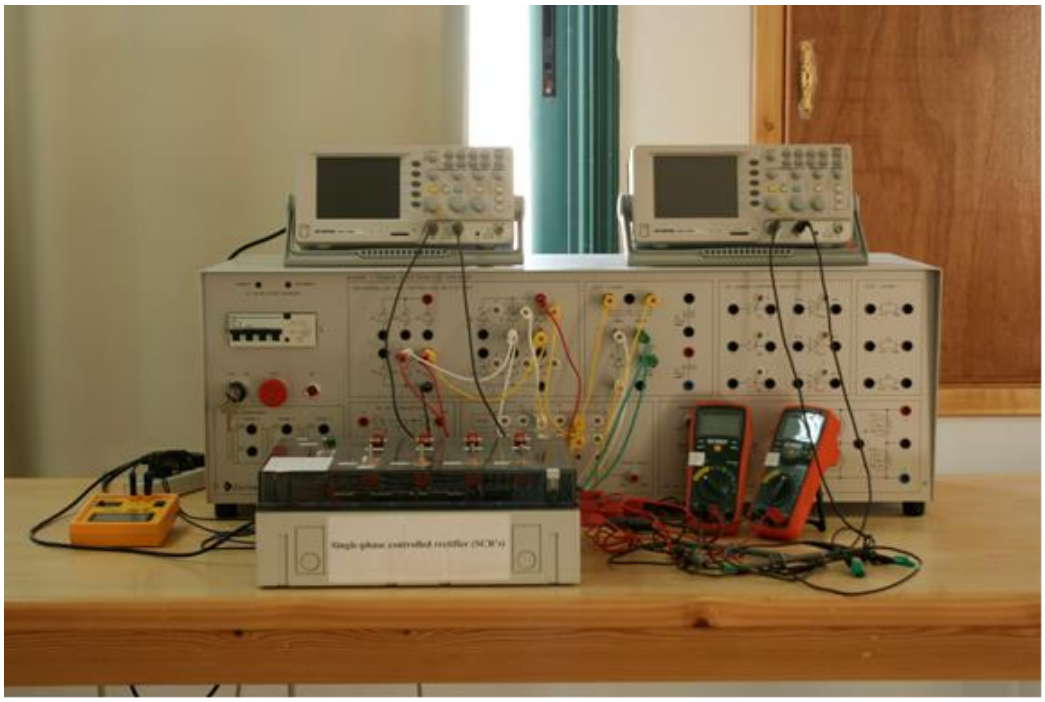
3.Procedure

- Connect the circuit as shown.
- measure diode voltage.
- measure the current of the circuit.
- draw the waveform of output current & voltage

Exp. (9) Half wave controlled (SCR). (R/RL/RLF/RE/RLE)

1.Objective

The effect of variable loads with Half wave rectifier bridge



2.Components

- SCR module of B3600 – Power Electronic trainer
- Resistive load
- Inductive loads
- wires

3.Procedure

- Connect the circuit as shown.
- measure the value of voltage and current.
- draw the waveform of output current & voltage.

EXP. (10) ED 5060M Console Motor Tacho

1.Objective

To measure the revolutions per minute (RPM) of a moving object

2.Components

- (2) Control Module.
- ED 5060M Console Motor Tacho.

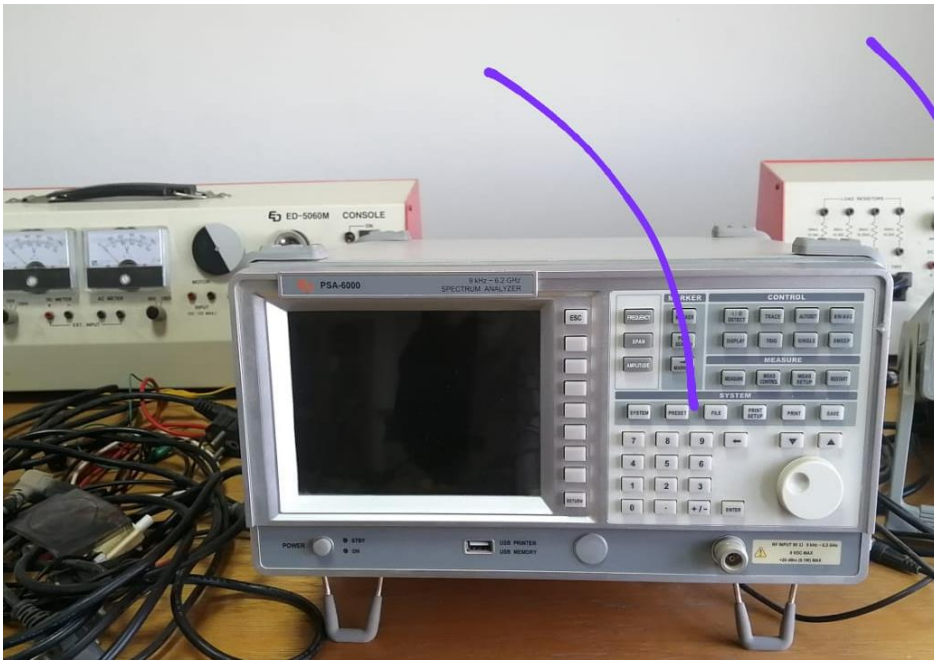
3.Procedure

- Connect the modules to the tachometer.
- Power on the device.

Exp. (11) Spectrum Analysis of wave

1.Objective

Analysis the waves



2. Components

- Spectrum Analyzer. (9KHZ – 6.2 GHZ).
- EDM Digital Multimeter.

3.Procedure

- turn on the Spectrum Analyzer.
- analysis of the waves.

EXP. (12) Fluke Power Quality Analyzer of AC signal

1.Objective

provide “Pass” or “Fail” information in accordance with industry.

standards.

2. Components

- Power Quality Analyzer.
- Variable Capacitor. (NO.2)
- Variable Resistance 1111110 ohm. (NO.2)
- Variable Coil. (NO.2)
- Capacitive load. (2.5 Micro F * 250 V * 18)
- Advance light AC filter.

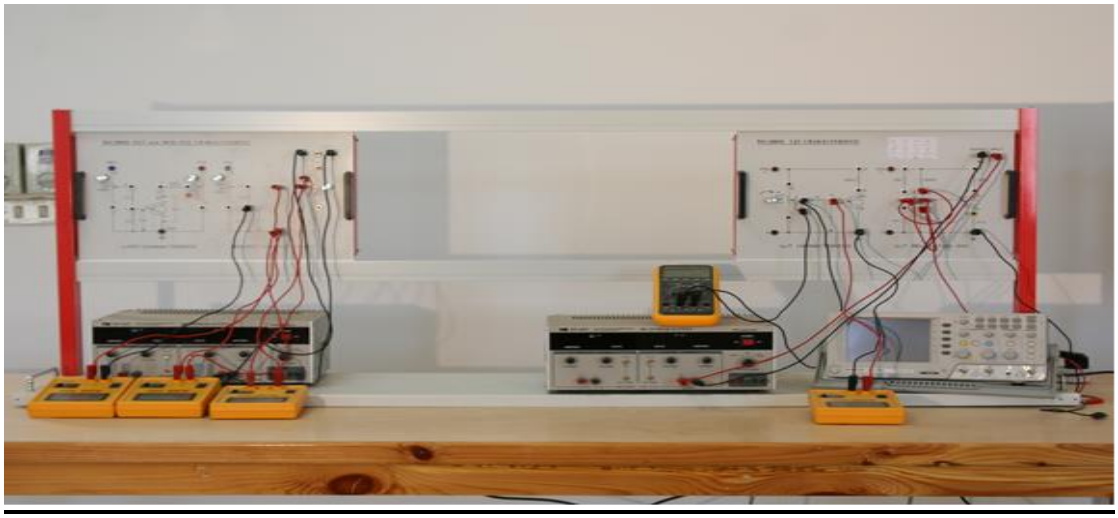
3. Procedure

- measure the value of the resistance.
- measure the value of the coil.
- measure the value of the capacitance.
- control the output.

EXP. (19) Transistor & UJT & SCR Characteristic

1.Objective

- used to amplify or switch electrical signals and power.
- control electric power and current by acting as a switch.
- digital platforms optimize algorithms.



2. Components

- NO – 2302A Transistor and Common Emitter Characteristic.
- NO – 2305A UJT Characteristic.
- NO. 2304A SCR Characteristic.
- Two Dual DC Power Supply.
- DC (0 to 30V)
- DC (5V/3A) Fixed output.
- three DC V Meter (Max. 250V).
- three DC A Meter (Max. 5A - 250m A).

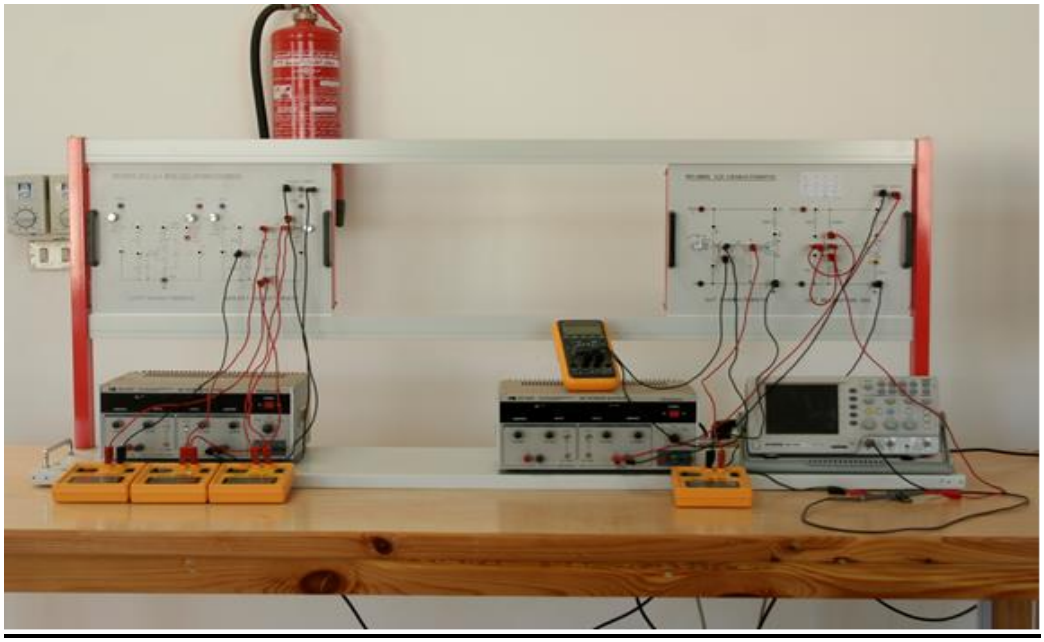
3. Procedure

- connect the circuit as shown.
- turn on the power supply.
- measure the value of the voltage and the current.
- control the output according to the device which is used.

EXP. (20) J – FET Characteristic / MOSFET Characteristic

1.Objective

- To demonstrate the operation of typical device.
- To measure characteristic of the device.



2.Components

- NO – 2303A FET and MOSFET Characteristic.
- Two Dual DC Power Supply.
    - DC (0 to 30V)
    - DC (5V/3A) Fixed output.
- Three DC V Meter (Max. 250V).
- Three DC A Meter (Max. 5A - 250m A).
- NO-2302A Transistor and Common emitter current Characteristic.
- NO-230A Diode and Zener Diode Characteristic.

3.Procedure

- connect the circuit as shown.
- measure the values of the voltage and current.
- control the output.

7.7 معمل جهد عالي (High voltage)

❖ **اسم المقررات التى يخدمها المعمل**

- اختبارات كهربية (4).
- اختبارات كهربية (6).
- هندسه الجهد العالي.
- تطبيقات في هندسه الجهد العالي.

❖ **قائمة بالتجارب الموجودة بالمعمل**

1. The main parts in H.V lab which used in experiment.
2. Sphere gap
3. Breakdown in oil
4. Corona Discharge
5. Breakdown of Air between small flat electrodes at different pressures.
6. Breakdown of Air between small flat electrodes at different pressures using vacuum pump
7. Impulse wave generation (wide band or narrow band).

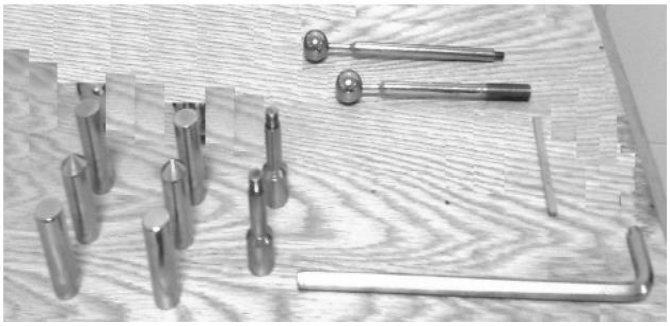
EXP (1) The main parts in H.V lab which used in experiment.

1.Objective

Complete knowledge of each part in the lab is very necessary.

2.Components

- Control panel.
- H.V transformer.
- Load capacitor.
- Measuring resistor.
- Wiring connection.
- Earthing rod.
- Vacuum pump.
- Air compressor.
- Vessel electrode.



EXP (2) Sphere gap

1.Objective

Breakdown of Gas Insulation

2.Components

- Sphere gap.
- Capacitor divider.
- H.V Transformer.
- Earthing rod.
- Control Panel.
- Protection Cage.

3.Procedures

- Breakdown of Air is measured at different distance between large sphere electrodes from 10mm up to 50mm.
- Drawing the Breakdown of Air gap at normal pressure.

EXP (3) Breakdown in oil

1.Objective

Breakdown test of liquid material is operated in test

2.Components

- H.V Transformer.
- Earthing Cage.
- Control Panel.
- Insulation Oil.
- Wiring Connections.
- Oil Tester.
- Capacitor divider.

3.Procedures

Breakdown of Oil at different distance is tested by applying the voltage to hemisphere electrodes which immersed in the oil.

EXP (4) Corona Discharge

1.Objective

Experiment illustrates simulation to the corona phenomena surrounding the conductor of Transmission lines

2.Components

- Corona vessel
- H.V Transformer.
- Connections.
- Control Panel.
- Protection Cage.

3.Procedures

A Corona phenomenon is studied to simulate the corona surrounding the conductors of transmission line.

EXP (5) Breakdown of Air between small flat electrodes at different pressures.

1.Objective

Breakdown of Gases is explained under different pressures.

2.Components

- Control Panel.
- High voltage test transformer (Power transformer).
- Capacitor Voltmeter.
- Connecting rods.
- Connecting cups.
- Air compressor.
- Vessel compressor.

3.Procedures

- Breakdown of Air is measured at different distance between small flat electrodes (homogenous field) in the vessel from 10mm up to 50mm at normal pressure.
- Drawing the Breakdown of Air gap characteristic at normal pressure.

EXP (6) Breakdown of Air between small flat electrodes at different pressures using vacuum pump

1.Objective

Measuring of breakdown for air between two electrodes with spacing (10mm up to 50mm) under pressure in range (1 bar up to 6 bar).

2.Components

- Control Panel.
- High voltage test transformer (power transformer).
- Capacitor voltmeter.
- Connecting rods.
- Connecting cups,
- Air compressor.
- Vessel compressor.

3.Procedures

1. Choose the small sphere electrodes.
2. Adjust:
   - Space with 10 mm between electrodes.
   - Turn-on the vacuum pump until the pressure reach to 100 mm Hg in meter of vessel and disconnect the vacuum pump from vessel and turn-off vacuum pump, Increase the voltage gradually until the breakdown occurs and records the voltage reading in table.
4. Adjust the space 10 mm, vessel pressure on 200 mm Hg and repeat step 3.
5. Adjust the space 10 mm, vessel pressure on 300 mm Hg and repeat step 3.
6. Adjust the space 10 mm, vessel pressure on 400 mm Hg and repeat step 3.
7. Adjust the space 10 mm, vessel pressure on 500 mm Hg and repeat step 3.
8. Repeat steps from step 3 up to step 7 when the space between electrodes are changed with spacing 20 mm, 30 mm, 40 mm, 50 mm)
9. Comment in results.
10. Choose the small flat electrodes and repeat the steps from (3 up to
11. Choose the small nozzle electrodes and repeat the steps from (3 up to 9).
12. Sketch the curve which illustrates the relation between the breakdown voltage and vacuum pressure when the spacing (10 mm).

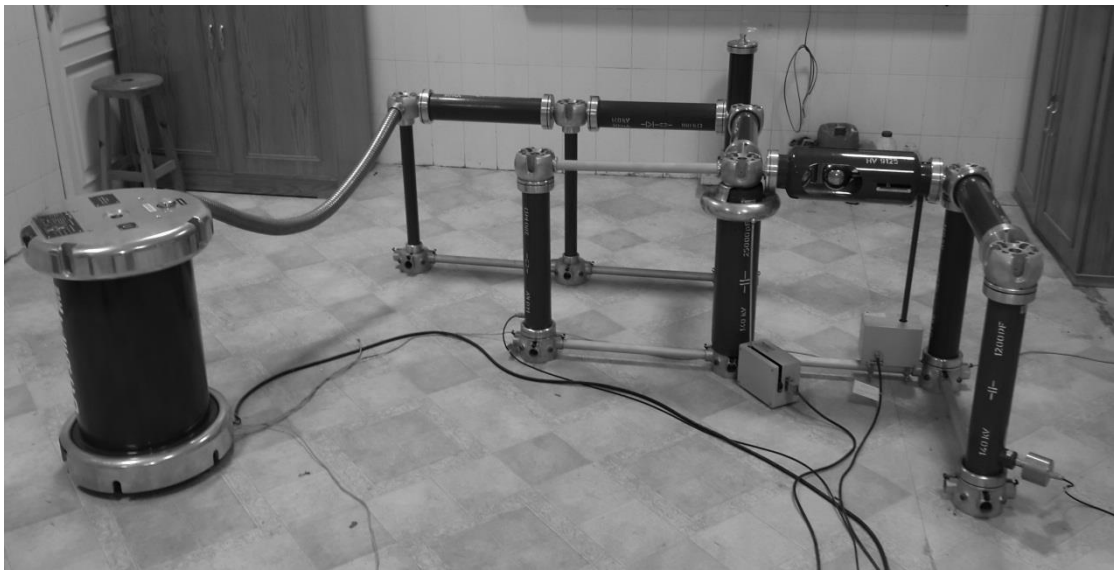
EXP (7) Impulse wave generation (wide band or narrow band).

1.Objective

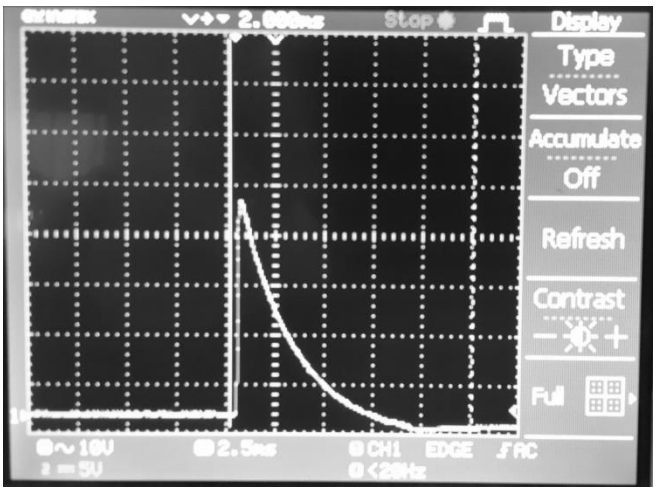
Draw the impulse wave for Impulse generator using oscilloscope.

2.Components

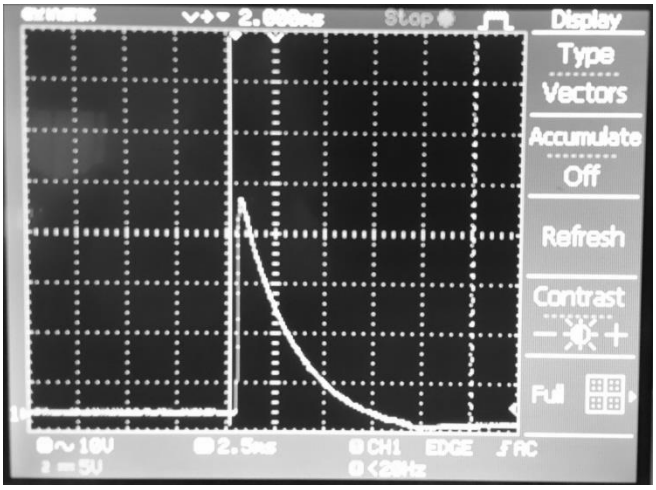
- Control Panel.
- H.V Transformer 100kv (RMS).
- Two rectifier diodes.
- Charging resistor.
- Smoothing Capacitor.
- Measuring resistor.
- Sphere gap.



3.Procedures



The wave is generated by using two Resistances (43 k Ω and 98 kΩ)



The wave is generated by using two Resistance (350 Ω and 2400Ω)

8. الخاتمة

يسعي قسم الهندسة الكهربية لمواكبة النمو السريع في مجالات الهندسة الكهربية بشعبتيها هندسة القوى الكهربية وهندسة الاتصالات عن طريق تطوير الاساليب والطرق التدريسية لتواكب تطلعات سوق العمل كما يقوم القسم بتنمية القدرات المعرفية للطالب والطالبات في مجال الهندسة الكهربية واعدادهم بالمهارات النظرية والتطبيقية علي حد سواء للمساهمة في اعداد كوادر مؤهلة للعمل في المجالات المحلية والعالمية.