Laboratory Guide

Mechatronics Engineering Department

Department Laboratories

No	Laboratory Name	Supervisor	Technical Supervisor
1	**Logic laboratory**	Dr. Muhamad Azhar Abdilatef	Rashad Adhed Al-saigh
2	**Electronics Laboratory**	Dr.Omar Saadallah Hamid	Eng. Ahmed Badran
3	**Measurements and Control Laboratory**	Dr. Sa'ad Ahmed Salih Al Kazzaz	Eng.Ahmed Abdelkarim Mohammed
4	**Computer Laboratory**	Raghad Raied Mahmood Al-shaker	Eng.Ahmed Badran
5	**Automation Laboratory**	Dr. Ali A. Abdulla	Ahmad W. Saleh
6	**Robotics Laboratory**	Dr.Saad Zaghlol	Eng.Abdullah Murtadha Alfakhrey
7	**General Mechanics Laboratory**	Dr. Laith Mohammed Jasim	Eng. Abdullah Mahmoud Abdullah
8	**Electrical Machines Laboratory**	Dr. Myasar Al-Attar	Eng.Shahad Waleed Ahmed
9	**Microprocessor Laboratory**	Dr. Ali A. Abdulla	Mamoon A. Omar
10	**Workshop**	Ahmad W. Saleh	Saeed Zaghlool Saeed

Microprocessor Laboratory

Workshop

Logic laboratory

Electronics Laboratory

Measurements and Control Laboratory

Computer Laboratory

General Mechanics Laboratory

Electrical Machines Laboratory

Robotics Laboratory

Automation Laboratory

Digital Logic Laboratory

Overview:

The Digital Logic Laboratory was established in 2007 and is considered an environment equipped with tools and devices that assist in studying and analyzing the logical relationships between electronic components and structures. It conducts experiments aimed at understanding and applying digital logic and digital systems in various fields of computer science and engineering. The laboratory is important for learning and developing logical computing skills and analyzing logical problems.

Objectives:

The objective of the Digital Logic Laboratory is to provide an educational and experimental environment that helps in understanding the fundamental concepts and principles of logic. It also aims to enhance critical and logical thinking skills and apply them to various scientific and life domains.

Experimental Lab:

The laboratory's work includes designing experiments and exercises that help to apply logical concepts in solving complex logical problems, analyzing logical data such as mathematical logic analysis and circuit construction using special tables for the logical structures and advanced circuits, building circuits based on logical equations, inside designing and testing digital circuits.

Stakeholders:

The logic lab provides opportunities for interactive learning and hands-on training, allowing students and researchers to practically understand logical concepts through their experiments and research projects. The Digital Logic Lab contributes to the development of methods and tools used in logic study, including the development of new software and advanced devices for analyzing logical data.

Health Guidelines:

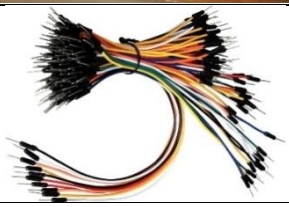
Below are some important safety and health guidelines for the Digital Logic Lab:

- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.
- Ensure the use of devices and equipment according to their specific instructions, and avoid conducting experiments without reviewing the necessary guidelines

.

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the Digital Logic Lab:

No.	Device name	Description	Quantity	Device Image
1	Multimeter	A device used for measuring current, voltage, resistance, frequency, and specialized measurements of some electronic components.	6	
2	Power Supply	Provides various voltage and current outputs with different values and readings.	1	
3	Digital Logic Kit	Includes various logic gates and other digital circuits, facilitating logical connections and conducting logical experiments.	6	
4	Connection Wires	Used to connect input and output points of logical circuits.	Not specified	
5	Data show	Used to display and present lectures and power point file		

Electronics Laboratory

Overview:

The Electronics Laboratory was established in 2006 and serves as a vital hub for learning and research in the field of electronics and electronic systems. It provides an environment equipped with the necessary technologies and tools to conduct experiments in various electronics-related fields, such as designing and developing electronic circuits and testing advanced electronic systems.

The Electronics Laboratory includes a diverse range of equipment and tools, including digital and analog oscilloscopes, test and measurement devices, and electronic control devices. Thanks to this laboratory, students and researchers can benefit from hands-on and interactive experiments to enhance their understanding of electronics concepts and develop their skills in designing and implementing various electronic systems.

Moreover, this laboratory represents one of the innovation and research centers in the field of electronic engineering within the university.

Objectives:

The Electronics Laboratory aims to provide a comprehensive environment that promotes learning, research, and innovation in the field of electronics. It prepares students and researchers to keep pace with technological advancements and contribute to the development of society and industry. Students are empowered to apply theoretical concepts learned in classrooms to real-world scenarios through practical experiments, enhancing their understanding of fundamental principles and techniques in electronics and developing their skills in designing and implementing electronic circuits.

Experimental Lab:

Various experiments are conducted in the field of electronics and circuit analysis. These experiments include the analysis of electrical circuits using multiple principles and theories, such as circuit simplification and finding equivalent circuits. The experiments involve dealing with elements such as resistors, capacitors, and inductors, as well as active components like diodes and transistors. Additionally, experiments include testing and measuring circuits using available test and measurement devices in the laboratory, measuring and testing different electronic circuits, analyzing their performance, and diagnosing potential issues. The laboratory also involves the design and construction of electronic circuits using a variety of electronic components.

Stakeholders:

The laboratory serves several stakeholders, including first and second-year students who benefit from practical learning opportunities and the application of theoretical concepts, aiding in the development of practical and analytical skills in the field of electronics. The Electronics Laboratory contributes to training students in modern skills and techniques in electronics, qualifying them for employment and meeting industry needs. The laboratory

can also contribute to the development of technology projects, such as renewable energy applications and monitoring systems, enhancing environmental quality and sustainability.

Health Guidelines:

Below are some important safety and health guidelines for the Digital Logic Lab:

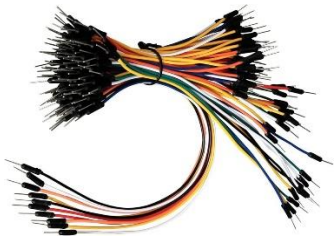
- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.
- Ensure the use of devices and equipment according to their specific instructions, and avoid conducting experiments without reviewing the necessary guidelines

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the electronic Lab:

No.	Device name	Description	Quantity	Device Image
1	Digital Multimeter	Used for measuring current, voltage, resistance, frequency, and specific measurements of electronic components.	5	
2	Analog Multimeter	Used for measuring current, voltage, resistance, frequency, and specific measurements of electronic components.	17	
3	Digital Tester (GDM-8145)	Multifunctional digital tester enabling accurate measurements with a digital display, features like backlight, and data storage.	1	

4	Linear Circuit Experiments Kit (KL-21001)	Includes voltage sources with different values, function generators, variable resistors, and voltage and current measurement devices.	6	
5	Digital Oscilloscope (OWON DS50)	Electronic measurement device used for monitoring and displaying electrical signals with a high-resolution screen and advanced measurement capabilities.	7	
6	Cathode Ray Oscilloscope (BK Precision)	Electronic device with multiple channels for measuring and displaying voltage as a function of time on the screen.	4	
7	Function Generator (SFG-2110)	Electronic device used to generate various types of electrical waves with multiple frequencies.	2	

8	Power Supply Unit (GPC-3030) DC P.S.	Electronic device used for converting and regulating electrical power digitally, with precision control and the ability to display digital information related to consumed or supplied power.	2	
9	Connecting Wires	Used for connecting input and output points for electrical circuits.	Not specified	
10	Pulse Generator (BK-4030)	Device generating sin & cos pulses at specific frequencies.	2	

Measurements and Control Laboratory

Overview:

The Measurements and Control Laboratory was established in 2008 and is considered an environment equipped with tools and devices that assist in studying and analyzing Measurements tools, sensors and some control systems used in mechatronics systems. It conducts experiments aimed at understanding and applying Measurement instruments and control systems in various fields of engineering. The laboratory is important for learning how to design devices for measuring current, voltage, temperature, humidity, etc., and learn the characteristics of some control systems and ways to use them in mechatronics systems.

Objectives:

Introducing the students to the types of sensors used in mechatronics systems and enabling them to distinguish between the properties of sensors and how to use them in various applications. Also introducing the student to some control systems, how they work, and how to use and apply them in various scientific and life fields.

Laboratory experiments:

The laboratory includes experiments that introduce the student to measurement methods and sensors, such as an experiment on sensing temperature and humidity, an experiment of measuring distance using an ultrasonic sensor, an experiment on measuring the level of liquid in a tank, an experiment on measuring the value of capacitance and inductance, an experiment on designing a voltage and current meter, experiments on different methods for measuring the value of electrical resistance, and an experiment on measuring Short distances accurately using Liner variable differential transformer LVDT.

The laboratory also provides experiments that familiarize the student with control systems, methods of representing them, and knowledge of their characteristics and uses, such as experiments with representing and simulating control systems on the MATLAB program, as well as experiments with the proportional-integral-differential controller (PID controller).

Stakeholders:

The laboratory provides opportunities for interactive learning and practical training, where students and researchers can learn about measurement tools, sensors, and some control systems used in mechatronics systems in a practical way through their own experiences and research projects, as the Measurements and Control Laboratory contributes to developing the methods and tools used in studying measurement methods and control systems.

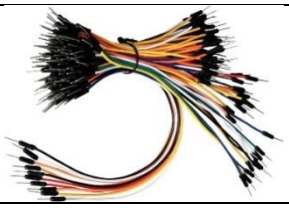
Health Guidelines:

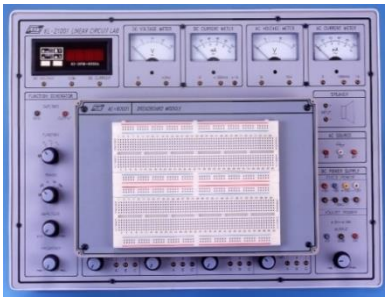
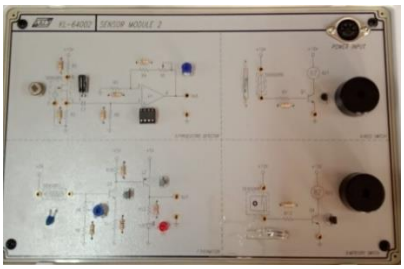
Below are some important safety and health guidelines for the measurement and control lab:

- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.
- Ensure the use of devices and equipment according to their specific instructions, and avoid conducting experiments without reviewing the necessary guidelines.

Laboratory Devices and Equipment:

below, a table of the devices and equipment for the measurement and control Lab:

No.	Device name	Description	Quantity	Device Image
1	Multimeter	A device used for measuring current, voltage, resistance, frequency, and specialized measurements of some electronic components.	**10**	
2	Power Supply	Provides various voltage and current outputs with different values and readings.	5	
3	Laptops	A high-speed machine for solving complex calculations and running design and simulation engineering programs	6	
4	Connection Wires	Used to connect input and output points of electrical circuits.	Not specified	

5	KL-21001 Linear circuit Lab	A device that contains voltage sources of different values, a function generator, variable electrical resistors, and devices for measuring voltage and current.	1	
6	Oscilloscope	a type of electronic test instrument that graphically displays varying voltages of one or more signals as a function of time.	7	
7	Function Generator	an electronic device used to generate different types of electrical waveforms over a wide range of frequencies.	3	
8	KL-64000 Sensors Modules	A set of modules each of which contains different sensors	15	
9	Arduino UNO R3 development Board	is an open-source microcontroller board based on the Microchip ATmega328P microcontroller	10	
10	Data show	Used to display and present lectures and power point files	1	

Computer Laboratory

Overview:

The Computer Laboratory, established in 2006, constitutes a fully equipped educational space spanning 19.5 square meters and accommodating up to 20 students. It is outfitted with 12 laptops and a projector (data show) to support various educational and research activities. The laboratory aims to enhance a deep understanding of computer science concepts, including programming, engineering drawing, and modeling within the field of mechatronics. The Computer Laboratory provides an interactive educational environment that enables students to apply theoretical knowledge in a practical setting, thereby enhancing their analytical and design skills.

Objectives:

The objective of the Computer Laboratory is to provide an advanced educational environment that contributes to enhancing students' understanding of computer and programming concepts, in addition to developing their skills in areas such as engineering drawing and modeling within the framework of mechatronics. The laboratory aims to enable students to apply theoretical knowledge in practical contexts, which enhances their analytical and design capabilities and equips them with the necessary skills to face future challenges in the fields of computing and technology.

Experimental Lab:

The laboratory includes experiments in various subjects such as:

1. Computer Science:
   - Enabling students to understand computing concepts and the basic operations of computers.
   - Developing students' skills in using word processing, spreadsheets, and presentation software.
   - Enhancing understanding of the fundamentals of operating systems, networking, and cybersecurity.
2. Programming:
   - Enabling students to acquire programming skills using the C++ language.
   - Developing the ability to solve problems and design programming algorithms.
   - Enhancing understanding of advanced programming concepts such as data structures, data handling, and arrays.
3. Engineering Drawing (AutoCAD):
   - Enabling students to acquire skills in using engineering drawing software like AutoCAD.
   - Enhancing understanding of engineering concepts and three-dimensional design.
   - Applying engineering concepts in the design of mechatronic systems and components.
4. Modeling:
   - Enabling students to acquire modeling skills using software such as MATLAB/Simulink or SolidWorks.

- Developing the ability to analyze and model mechatronic systems using computational tools.
- Enhancing understanding of modeling processes, simulation, and analysis of results to improve the performance of mechatronic systems.

Stakeholders:

The Computer Laboratory in the Department of Mechatronics Engineering provides its students at all educational levels with a rich and advanced learning environment, enabling them to apply theoretical knowledge in practical contexts. Through diverse laboratory experiments, students develop advanced skills in programming, engineering drawing, and modeling, alongside enhancing their understanding of the fundamentals of computer science. This interactive approach contributes to refining their capabilities, equipping them with the necessary skills to face current and future challenges in the field of mechatronics engineering and preparing them efficiently for the job market.

Health Guidelines:

Below are some important safety and health guidelines for the Computer Lab:

- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the Computer Lab.:

No.	Device name	Description	Quantity	Device Image
1	**Laptop**	Conducting experiments	**12**	
2	Data show	Used to display and present lectures and power point file	1	

Automation Laboratory

Overview:

This lab was established in 2008 and it is considered one of the important lab in the mechatronics department. Students can learn in this lab the basic of electronic controlling and PLC programming, CNC lathe machine, CNC milling machine, CNC engraving machine and pneumatic training systems.

Objectives:

To train the students on how to use electronical controlling cards and computerized cutting machines.

Experimental Lab:

It consist of the following: -

1- PLC.
2- CNC lathe machine training.
3- CNC milling machine training.
4- CNC engraving machine training.
5- Pneumatic system training.

Stakeholders:

Undergraduate students are basically the main users of the lab, namely, the fourth-class students. Most of the experiment those are given in this lab are belong to the automation subject that is given in the last year of the undergraduate curriculum. The staff of the department, the undergraduate students and the researchers may also do their projects and research in this lab. In addition, the consultation bureau can also be served through this lab.

Health Guidelines:

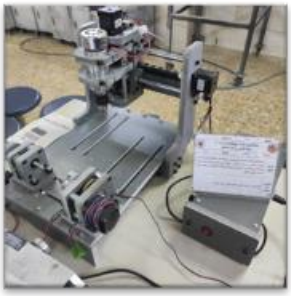
Below are some important safety and health guidelines for the Automation Lab:

- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.
- Ensure the use of devices and equipment according to their specific instructions, and avoid conducting experiments without reviewing the necessary guidelines

.

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the Automation Lab:

No.	Device name	Description	Quantity	Device Image
1	5-axis CNC Milling machine	It is a programmed milling device that adopt 5-axes during machining of most of the materials such as steels, aluminum, brass and plastics. The working area is approximately 40 cm X 40 cm X 20 cm.	1	
2	CNC engraving machine	It is a programmed device which can be used to engrave most of the materials such as steels, aluminum, brass and plastics. The working area is 25 cm X 25 cm X 10 cm.	5	
3	Pneumatic training system	It consists of many pneumatic components such as valves, connections, pumps, actuators …etc.	1	
4	PLC Logo	PLC from for training on PLC programming in multiple languages with some practical applications.	4	
5	PLC KIT FX1N20MR	Laboratory board manufactured in mechatronics engineering department, mosul university .it works based on a Mitsubishi PLC which used for training on programming with applications for controlling certain sensors and indicators, as well as conveyor belt experiments, photoelectric sensor for cars, and controlling the direction of a three-phase motor, etc.	6	

Robotics Laboratory

Overview:

The Robotics Lab was established in 2008 and is dedicated to research and experiments focusing on the interaction between humans and machines, as well as the development of various robotic systems. It includes a range of experiments and devices to help students understand and analyze robotic systems and study related sciences. Additionally, it provides researchers with devices and tools to innovate new control methods and mechanisms for robot systems to contribute to the advancement of scientific research in this field.

Objectives:

The Robotics Lab aims to develop, test, and advance various types of robot systems through research and experimentation, fostering understanding of their components and functionalities.

Experimental Lab:

Robotics Lab encompass testing various control algorithms, assessing sensor effectiveness, experimenting with actuators and motors, studying human-robot interaction dynamics, developing autonomous decision-making algorithms, integrating artificial intelligence techniques, evaluating system robustness, exploring ethical implications, and collaborating across disciplines.

Stakeholder

The potential beneficiaries of the Robotics Lab include students majoring in Mechatronics Engineering or related fields, researchers specializing in robotics, and companies seeking to integrate humanoid systems into their operations.

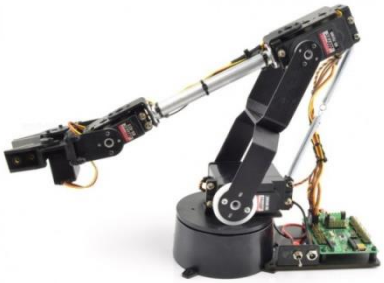
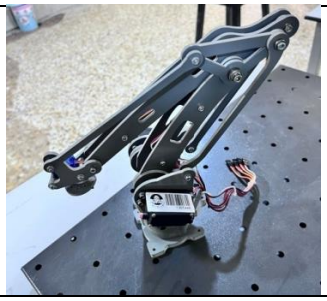
Health Guidelines:

Below are some important health guidelines for the Robotics Lab:

- Ensure that fire alarms and extinguishing devices in the lab are checked and functioning at all times, provide emergency exits, ensure their safety and accessibility.
- Provide well-insulated electrical sockets and ensure they are not damaged, provide protection against electrical shocks.
- Ensure the use of devices and equipment according to their specific instructions, avoid conducting experiments without reviewing the necessary guidelines.
- Maintain a safe distance from robot systems during operation to avoid accidents in case of malfunctions.

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the Robotics Lab.:

No.	Device name	Description	Quantity	Device Image
1	Lab Volt 5100 Robot	An educational system featuring an industrial robot designed to teach students principles of robotics, motion control, and automation. The system provides a simulated learning environment for industry and manufacturing, where students learn how to program and operate the robot using a simple programming interface.	1	
2	LEGO NXT Robot	The NXT robot offers a fun and interactive learning environment for students to grasp concepts of engineering, programming, and robotics. Students can build a variety of robots using available parts and customize them to perform different tasks, such as movement, sensing, and interacting with the surrounding environment.	3	
3	Lynxmotion Robot	Comprising a set of movable joints, the Lynxmotion robot allows the arm to move similarly to a human arm. It can be remotely controlled using various control systems, enabling users to execute a variety of tasks such as exploration, assembly, and loading.	1	
4	Robot Arm	robotic arm consisting of a set of servo motors to control various joints, simulating human arm movement and performing different tasks.	2	

General Mechanics Laboratory

Overview:

The General Mechanics Lab was established in 2017 and is equipped with tools and devices that facilitate the study of practical applications of mechanical phenomena. It is used for conducting experiments aimed at understanding and applying mechanical fields and their practical and engineering applications. The lab is essential for learning and developing students' skills in solving mechanical problems.

Objectives:

The objective of the General Mechanics Lab is to enhance students' understanding of the theoretical aspect of mechanical engineering materials taught in the Mechatronics Engineering department. This includes topics such as Statics, Dynamics, Manufacturing Processes, Engineering Materials, Mechanics of Materials, Machine Mechanics, and Machine Component Design. The lab conducts practical experiments to enable and assist Mechatronics engineers in designing and building the basic mechanical system, which is the first building block in creating an integrated Mechatronics system.

Laboratory experiments:

The lab includes the design of experiments and exercises that help apply practical concepts in solving mechanical problems. Some examples include the Hook's Law experiment, torsion testing, coefficient of friction for inclined surfaces, and reaction testing.

Stakeholders:

The lab provides opportunities for interactive learning and hands-on training. Students and researchers can gain practical knowledge and understanding through their own experiments and research projects.

Health Guidelines:

Below are some important health guidelines for the Mechanical Engineering Lab:

Ensure the presence of fire alarms and firefighting equipment in the lab, provide emergency exits, and ensure their safety and easy accessibility.

Ensure good ventilation in the lab to minimize the accumulation of harmful gases or toxic fumes.

Provide well-insulated electrical sockets and ensure they are not damaged, and provide protection against electrical shocks.

Use devices and equipment according to their specific instructions and avoid conducting experiments without reviewing the necessary guidelines.

- Wear protective goggles and lab coats while working in the lab.

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the general mechanics Lab.:

NO	Device name	Description	Quantity	Device Image
1	Extension and compression of spring	The device is a vertical wall-mounted holder that is used to test tension and compression springs. It consists of two separate mechanisms placed side by side. One mechanism is designed for testing tension springs, while the other .is for testing compression springs	1	
2	Reaction of beams Apparatus	A metal base is fixed vertically at its ends with two horizontal columns. Suspended from these columns are two spring balances, and a horizontal column is suspended from the springs. The experiment involves attaching weights at different points along this column and observing the effect of .these weights on the springs	1	
3	Friction on an inclined plane	The unit consists of a sturdy aluminum base plate with non-slip feet and a vertical column in the center. Attached to this base is a steel surface that can be locked in any inclined position within a limited range of ±45 degrees using adjustable protractors. A frictional material is placed on this inclined surface and secured with a rope, which is then passed over a pulley and connected to a weight to control the .level of slippage or increase it	1	
4	Torsion	It consists of samples that are securely fastened in a clamp attached to one end of the upper main frame of the seat. At the other end, there is a loading chair that contains a sample holder clamp and a wire wound around its circumference. Weights are hung on the wire to allow .for the application of torque	1	
5	Rope Belt Friction Apparatus	The device consists of a wall-mounted stationary pulley with a loaded belt. It is used together with pulleys with four V-grooved angles: 120, 90, and 60 degrees	1	

6	Toggle Joint Apparatus	A load is applied to a pair of links through a suspended weight carrier at the point of contact between the links. One of the links has one end fixed to the base, while the other link has one end capable of movement on low-friction ball-bearing wheels of a loading chair. The links are constrained by a horizontal spring balance, which directly measures the .horizontal interaction between them	1	
7	Triangle of Forces	A base plate is attached to a seat, with a raised circular table containing a central pin and a 360-degree rotating platform. The table has three adjustable clamps with rollers along its edge. There are three sets of wires with hooks, connected to a central ring and terminating at weight holders. The central .ring is fixed above the central pin	1	
8	Rotating Fatigue Machine	A motor with a speed of 2800 revolutions per minute rotates a sample through a gear and pulley system, with speeds ranging from 5600 to 1400 revolutions per minute. The load is applied to the sample through a screw mechanism that includes a load measuring cell. The device is equipped with a digital display that shows the applied force and the number of sample rotations, and the display can be zeroed before each experiment. When the sample fails, a small switch turns off the motor while the number of rotations remains .recorded on the screen	1	
9	Alternating Bending Fatigue Machine	A motor is connected to a sample, with one end of the sample left free to facilitate bending. The free end of the sample can move up and down through a frequency mechanism, allowing the device to apply significant bending, generating high stresses in non-metallic samples with low .Young's modulus values	1	
10	Acceleration Apparatus	The carriage carrying five removable blocks slides on two rails connected to the base. An electrically sensitive paper strip is passed through a spark generator connected to the carriage, producing five pulses per second. This allows for precise measurement of the acceleration of the .carriage	1	

Electrical Machines Laboratory

Overview:

The Electrical Machines Laboratory was established in 2011 as a dedicated space for conducting experiments and tests on electrical machines and associated control devices. The purpose of this laboratory is to examine and test the performance of electrical machines of various types, such as motors, transformers, and others, to ensure their efficient and safe operation. A variety of electrical and mechanical tests are conducted in this laboratory, along with performance measurements. The laboratory relies on specialized measurement and testing equipment to ensure result accuracy and enhance understanding of the operation of electrical machines.

Objectives:

The objectives of the Electrical Machines Laboratory is to conduct experiments and tests on various types of electrical machines and their control devices. This is done to ensure their efficient and safe operation by examining and evaluating their performance. Through a range of electrical and mechanical tests, the laboratory aims to enhance understanding of the operation of electrical machines and to ensure the accuracy of results through specialized measurement and testing equipment. Ultimately, the laboratory's objective is to contribute to advancements in electrical machine technology and promote their effective utilization in various applications.

Experimental Lab:

The laboratory conducts experiments on electrical machines and motors to understand how they operate, interact with them, control them, regulate their speed, as well as connect electrical transformers, derive their equivalent circuits, determine component values, understand transformation ratios, and explore practical applications in circuits, facilities, and industries.

Stakeholders:

The beneficiaries of the Electrical Machines Laboratory may include

- Researchers and Engineers: Experts and engineers can utilize the laboratory to develop new techniques in the field of electrical machines and enhance their performance.
- Students and Learners: University and institute students can learn from laboratory experiments and grasp scientific concepts related to electrical machines.

Overall, any entity relying on or utilizing electrical machines can benefit from the services and results of the Electrical Machines Laboratory.

Health Guidelines:

Here are some basic health and safety guidelines in the Electrical Machines Laboratory:

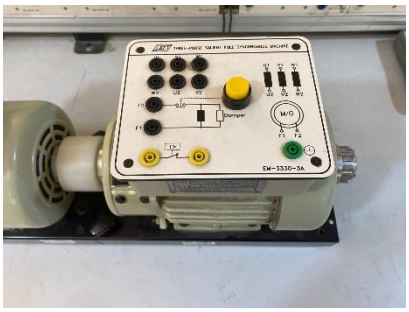
- Equipment Safety Check: Before using electrical equipment, it's essential to ensure its safety along with the safety of cables, sockets, switches, and rotary switches.
- Safe Operating Procedures: Operations should be carried out according to safety guidelines, and operating without supervision should be avoided.

- Training and Education: Adequate training should be provided to employees on how to use equipment safely and follow correct procedures.
- Regular Maintenance: Regular maintenance of electrical equipment should be conducted, and any issues should be addressed before they lead to accidents.

Electrical laboratories adhere to industry standards and safety regulations to ensure a safe and healthy working environment for all employees and visitors

Laboratory Devices and Equipment:

In below, a table of the devices and equipment for the Electrical Machines Lab.:

No.	Device name	Description	Quantity	Device Image
1	Multimeter	A device used for measuring current, voltage, resistance, frequency, and specialized measurements of some electronic components.	6	
2	dc motor	A device that converts electrical energy to mechanical and rotates loads works on direct current	4	
3	synchronous motor	A device that converts electrical energy to mechanical and rotates loads works on Alternatingcurrent	1	
4	Connection Wires	Used to connect input and output points of logical circuits.	Not specified	
5	power analyzer	to analyze power component	1	

Microprocessor Laboratory

Overview:

The laboratory was established in 2008. The Microprocessor Lab is an educational and research environment dedicated to studying, understanding, and developing electronic processors. The aim of this laboratory is to provide a deep understanding of processors and related technologies, including microengineering and processor programming. Among the fundamental concepts taught and applied in the Processor Lab is assembly language.

Objectives:

The Microprocessor Lab aims to provide students with the fundamental principles of microprocessor subjects, including learning their programming and implementation on lab devices through a set of laboratory experiments. Students become acquainted with the basic concepts of microprocessors, preparing engineers with the knowledge and competence to interact with them.

Laboratory experiments:

The lab includes experiments designed to enable students to understand and apply the concepts of assembly language, and learn how to use the DEBUG program to analyze and debug programs. Additionally, it covers the basics of arithmetic and logical operations performed within the microprocessor.

Stakeholders:

The lab provides opportunities for interactive learning and hands-on training, allowing students and researchers to benefit from developing their practical skills in the field of microprocessors and programming. It also enables them to understand the theories related to microprocessors and apply them practically.

Health Guidelines:

Below are some important safety and health guidelines for Microprocessor lab:

- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.
- Ensure the use of devices and equipment according to their specific instructions, and avoid conducting experiments without reviewing the necessary guidelines.

Laboratory Devices and Equipment:

below, a table of the devices and equipment for the microprocessor Lab:

No.	Device name	Description	Quantity	Device Image
1	Computer	It is used to execute various experiments and projects related to microprocessors and assembly language.	9	
2	MTS-86C Kit	It helps students understand the structure and programming of the 8086 computers.	6	
3	Oscilloscope	It is used to display and analyze the waveform of electronic signals.	4	
4	Top 2007 IC-programmer	It is used in programming a wide range of EPROMs, microcontrollers, EEPROMs, and GAL ICs.	2	
5	DC power supply	Providing voltage and current with various values and readings.	3	
6	Data show	Used to display and present lectures and power point files	1	

Workshop

Overview:

The workshop had been established since 2006 and it contains the basic mechanical instruments such as spanners, screw drivers, files … etc and other devices such as lathe machine which help to combine the lectures received in class and the practical training.

Objectives:

To give students the basic techniques those used are in plain workshop.

Experimental Lab:

Many experiments can be given in about two hours of workshop works that can be given usually to many groups of students. Those experiments are concluded as follow: -

1. Turning operation 2. Milling operation 3. Drilling 4. Wood works 5. Arc welding
6. grinding operation 7. Filing 8. Measurements.

Stakeholders:

Undergraduate students, namely the first grade students, are the main target of the workshop by allowing training for the basic techniques such as lathe operation, drilling …etc. Final grade students can also use the workshop for doing their undergraduate projects specially the mechanical parts. Faculty and graduate students can also do their research rigs and equipment in the workshop.

Health Guidelines:

Below are some important safety and health guidelines for the Workshop:

- Ensure the presence of fire alarm systems and firefighting equipment in the laboratory, provide emergency exits, and ensure their safety and accessibility.
- Ensure the presence of a good ventilation system in the laboratory to reduce the accumulation of harmful gases or toxic fumes.
- Provide well-insulated electrical sockets and ensure they are not exposed to damage, and provide protection against electric shocks.
- Ensure the use of devices and equipment according to their specific instructions, and avoid conducting experiments without reviewing the necessary guidelines.

Laboratory Devices and Equipment:

below, a table of the devices and equipment for the workshop

No.	Device name	Description	Quantity	Device Image
1	Multimeter	A device used for measuring current, voltage, resistance, frequency, and specialized measurements of some electronic components.	2	

2	Power supply	It supports variable voltages and amperes	1	
3	Lathe machine	It is used for longitudinal and face turning, teeth machining, drilling, boring …ect for different materials such as steels, brass, aluminum, plastics …etc.	1	
4	Arc welding	It used for welding steels.	1	
5	Bench drill machining	It is used for drilling different material such steels, plastics, wood, aluminum, brass …etc.		
6	Portable power saw	It is used basically for cutting woods, aluminum, acrylic and plastics.		
7	Oscilloscope	A device used to study electrical transmission patterns as well as power and frequency