

Department of Instrumentation and Control Engineering

Courses Offered to Semester-I and Semester-II



COEP Technological University, Pune

Semester-I

- 1. Fundamentals of MATLAB and Simulink (FMAS) (Credits:03)**
Engineering Sciences Course-I (ES-I)
(Compulsory For Instrumentation and Control Engineering Students)
- 2. Fundamentals of Measurement and Sensors (FMS) (Credits:03)**
Engineering Sciences Course-II (ES-II)
(Choice Based Course)
- 3. Fundamentals of Programmable Logic Controller (FPLC) (Credits:02)**
Vocational and Skill Enhancement Courses (VSEC)
(Choice Based Course)

Semester-II

- 1. Basics of Measurement and Sensors (BMS)** **(Credits:03)**
Engineering Sciences Course-I (ES-I)
(Compulsory For Instrumentation and Control Engineering Students)
- 2. Fundamentals of Measurement and Sensors (FMS)** **(Credits:03)**
Engineering Sciences Course-II (ES-II)
(Choice Based Course)
- 3. Fundamentals of Programmable Logic Controller (FPLC)** **(Credits:02)**
Vocational and Skill Enhancement Courses (VSEC)
(Choice Based Course)

Fundamentals of MATLAB and Simulink (FMAS)

Engineering Sciences Course- I

Course Offered to Semester I

3

credits

Teaching Scheme

L-2

T-0

P-2

S-1

Evaluation Scheme

MSE-30

TA-20

ESE-50

CIE-100



KEY LEARNING

- Understanding of the **MATLAB environment**, including the **Workspace, Command Window**, and **basic tools**.
- Work with **variables, arrays, vectors, matrices**, and **operators**.
- **Solve** engineering problems using **numerical computing**
- **Perform 2D and 3D plotting** for data visualization and analysis.
- Perform **simulation** and analyze **system outputs** using **Simulink**.



IMPORTANCE

- Develops **computational** and **programming skills** for solving engineering problems.
- Provides a powerful environment for **numerical analysis, mathematical computation**, and **data visualization**.
- Enhances **problem-solving** and **analytical skills**.
- Provides **electric circuit modeling** and **simulation**



APPLICATION AREAS

- **Programming:** Developing scripts, functions, and algorithms for engineering applications.
- **Control Systems:** Modeling, simulating, and analyzing open-loop and closed-loop control systems.
- **Numerical Methods:** Solving ordinary differential equations and other mathematical problems.
- **Industrial Applications:** System testing, automation, etc.

Fundamentals of Measurement and Sensors (FMS)

3

credits

Engineering Sciences Course- II

Course Offered to Semester I and II

Teaching Scheme

L-3

T-0

P-0

S-1

Evaluation Scheme

MSE-30

TA-20

ESE-50



KEY LEARNING

- Understand **measurement systems, sensors, transducers, errors and calibration.**
- Learn **resistance, inductance and capacitance measurement techniques.**
- Study functionality of **CRO, DSO and DMM.**
- Learn measurement of **displacement, velocity, acceleration, force and torque.**
- Develop ability to **select suitable sensors for specific applications.**



IMPORTANCE

- Provides the fundamental knowledge required for **measurement and instrumentation systems.**
- Develops understanding of **sensor characteristics, measurement errors, calibration and selection criteria.**



APPLICATION AREAS

- **Industrial Automation** – position, speed, force and process-variable measurement.
- **Robotics** – joint displacement, velocity, acceleration, force and torque sensing.
- **Manufacturing and CNC Machines** – dimensional/displacement measurement and machine monitoring.
- **Automotive Systems** – acceleration, speed, torque and position measurement

Fundamentals of Programmable Logic Controller (FPLC)

Vocational and Skill Enhancement Courses

Course Offered to Semester I and II

2

credits

Teaching Scheme

L-1

T-0

P-2

S-1

Evaluation Scheme

TA-20

ESE-30

CIE-50



KEY LEARNING

- **Understand** the architecture of Programmable Logic Controllers
- **Develop** ladder logic programs using logical, timer, counter and arithmetic instructions.
- **Understand** I/O interfacing and PLC communication protocols.
- **Develop** PLC-based control logic for motor sequencing, tank level, bottle filling and object sorting applications.



IMPORTANCE

- Real time **remote monitoring** and control of industrial process.
- Cloud-connected **smart factory automation**
- **Supervisory Control** and HMI
- **Motion Control** and Drives operation



APPLICATION AREAS

- **Industrial Automation** – Process and machine control.
- **Motor Control** – motor sequencing, DOL and wye-delta starters.
- **Process Automation** – tank level and batch control.
- **Manufacturing** – bottle filling and object sorting.
- **Material Handling** – automated sorting and processing.

Basics of Measurement and Sensors (BMS)

Engineering Sciences Course- I

Course Offered to Semester II

3

credits

Teaching Scheme

L-2

T-0

P-2

S-1

Evaluation Scheme

MSE-30

TA-20

ESE-50

CIE-100



KEY LEARNING

- Understand **measurement systems, sensors, transducers, errors and calibration.**
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- **Manufacturing and CNC Machines** – dimensional/displacement measurement and machine monitoring.
- **Automotive Systems** – acceleration, speed, torque and position measurement
- **Civil-Structural** health monitoring