AMPUSH

AMPUSHWORKS ENTERPRISES PRIVATE LIMITED

Technical Training Programmes 2026–27

SYLLABUS

Robotics and Automation

Course information	
Programme	5. Robotics and Automation
Duration	One month
Total hours	102 hours (theory 32, practical 64, examinations 6)
Course fee	₹3,000 per candidate
Batch size	Minimum 10 candidates; batches scheduled after sufficient registrations
Eligibility	B.Tech, Diploma, ITI, B.Sc and BCA students, engineering graduates, working professionals and college faculty
Prerequisites	Basic electronics and basic microcontroller programming.

1. Course Introduction

This course teaches how robots sense their surroundings, make decisions and move. It combines mechanical assembly, electronics and programming, and introduces the basic principles of automation.

2. Course Objectives

On completing this course, candidates will be able to:

- Describe types of robots and their applications
- Select and drive DC, servo and stepper motors
- Use sensors for navigation and obstacle detection
- Program robot behaviour and control logic
- Build and test a working robot

3. Hours Distribution

Component	Hours
Theory classes (8 units × 4 hours)	32
Practical sessions (14 labs × 4 hours)	56
Mini project (practical)	8
Theory examination	2
Practical examination	4
Total programme hours	**102**

Practical sessions including the mini project total 64 hours (56 + 8). The examinations (6 hours) are held after completion of the training.

4. Theory Syllabus (32 hours)

Unit	Topics covered	Hours
Unit 1	INTRODUCTION TO ROBOTICS • Types of robots and applications • Parts of a robot: body, actuators, sensors, controller • Safety in robotics work	4
Unit 2	MECHANICAL BASICS • Chassis, wheels and gears • Torque, speed and load • Assembly practices	4
Unit 3	MOTORS • DC motors and gear motors • Servo motors • Stepper motors	4
Unit 4	MOTOR DRIVERS • H-bridge and motor driver modules • Speed and direction control • Power supply for motors	4
Unit 5	SENSORS FOR ROBOTS • IR and line sensors • Ultrasonic distance sensors • Encoders and limit switches	4
Unit 6	ROBOT PROGRAMMING • Reading sensors and making decisions • State-based behaviour • Tuning and testing	4
Unit 7	CONTROL AND AUTOMATION BASICS • Open-loop and closed-loop control • Introduction to PID concepts • Automation in industry	4
Unit 8	ROBOTIC ARMS AND APPLICATIONS • Degrees of freedom • Servo-based arm control • Pick-and-place applications	4

5. Practical Sessions (64 hours)

Lab	Practical assignment	Hours
1	Assemble a robot chassis	4
2	Run DC motors with a motor driver	4
3	Speed control with PWM	4
4	Servo motor positioning	4
5	Stepper motor control	4
6	IR line sensor reading	4
7	Ultrasonic obstacle detection	4
8	Line-following robot	4
9	Obstacle-avoiding robot	4

Lab	Practical assignment	Hours
10	Bluetooth-controlled robot	4
11	Encoder-based distance measurement	4
12	Servo-driven robotic arm control	4
13	Simple pick-and-place sequence	4
14	Fault-finding in a robot	4
MP	Mini project: Autonomous robot: line-following with obstacle avoidance and remote override.	8
	Total practical hours	**64**

6. Mini Project

Project: Autonomous robot: line-following with obstacle avoidance and remote override.

Each candidate (or small group) plans, builds, tests and documents the project during the final practical sessions, and presents it during the practical examination.

7. Hardware, Tools and Software

- Robot chassis kits, wheels and gear motors
- Servo and stepper motors with drivers
- IR, ultrasonic and encoder sensors
- Microcontroller boards and batteries

8. Learning Outcomes

By the end of the course, candidates will be able to:

- Assemble and wire a mobile robot
- Drive and control different motor types
- Program robot behaviour using sensors
- Explain basic control and automation concepts

9. Assessment and Certification

Examination	What is assessed	Duration
Theory examination	Understanding of concepts, components and principles covered in the 8 units	2 hours
Practical examination	Ability to build, wire, program, test and fault-find; presentation of the mini project	4 hours

Practical assignments completed during the course are also reviewed as part of the practical assessment.

A **training completion certificate** will be issued subject to successful completion of the programme and assessment requirements.

10. Enrolment and Contact

To enrol, send your name, mobile number, college or organisation, course and year, and the name of this programme to Ampushworks. You will be informed when your batch is scheduled.

Contact	Details
Address	Priyadarshi Nagar, Bhagwat Nagar, Patna, Bihar – 800026
Website	https://ampushworks.com
Registration form	https://www.ampushworks.com/training.html#register
Email	support@ampushworks.com
Phone	+91 94702 13936
WhatsApp	+91 94702 13937

Note: This syllabus may be updated by Ampushworks to reflect new technology and equipment. The syllabus issued at the start of a batch applies to that batch.