

ROBOTICS & ARTIFICIAL INTELLIGENCE

AS PER NEP 2020

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PREFACE

"Opportunities are usually disguised as hard work, so most people don't recognize them."
– Ann Landers

Robotics is the field of designing, building, and programming robots to perform tasks autonomously or assist humans in various industries, from manufacturing and healthcare to exploration and entertainment, advancing automation and human-machine interaction.

Welcome to the fascinating world of **ROBOTICS & ARTIFICIAL INTELLIGENCE** As you hold this book in your hands; you are embarking on a journey into the realm where human ingenuity and technological advancement converge to create machines that can perform tasks beyond our wildest imaginations.

ROBO BRAIN a series for grades 6 to 12 for ICSE schools is written keeping in mind about the future and scope that lies in robotics.

The salient features of the book are as follows:

- Focus on skill based learning to encourage experimental learning.
- Content are easy to understand.
- Each chapter contains STEM based practical.
- Arduino Programming is explained with syntax and simple examples for better understanding.
- Robotics assignment is included as per NEP.
- **Robotics kit** required in each practical is available on our official site:

-Author

CONTENTS

1. INTRODUCTION TO ROBOTICS

- 1.1. Understanding Robots
- 1.2. Evolution of Robots
- 1.3. Laws of Robotics
- 1.4. Classification of Robots
- 1.5. Real World Robots and Applications

2. ROBOT AS A SYSTEM

- 2.1. Building Blocks of Robots
- 2.2. Concept of Mechanical, Electronic, and Computational Blocks
- 2.3. Design Aspects of Robots
- 2.4. Illustrations: Industrial, Humanoid, and Mobile Robots

3. CONCEPTS IN ROBOTICS

- 3.1. Motion
- 3.2. Types of Motion
- 3.3. Joints
- 3.4. Links
- 3.5. Degree of Freedom

4. ARDUINO PROGRAMMING

- 4.1. Introduction to Arduino
- 4.2. Setting up Arduino IDE
- 4.3. Basics of Arduino Programming
- 4.4. Input & Output Pins and Control
- 4.5. Basic Arduino Projects
- 4.6. Interface Sensors and Actuators with Arduino
- 4.7. Debugging and Troubleshooting Arduino Code

5. INTRODUCTION TO ARTIFICIAL INTELLIGENCE (AI)

- 5.1. Meaning and Brief History of AI
- 5.2. AI Subsets
- 5.3. AI Life Cycle
- 5.4. Turing Test
- 5.5. Applications and Benefits of AI
- 5.6. Ethical Consideration in AI

6. ROLE OF DATA AND EVOLUTION OF COMPUTING

- 6.1. Data and Information
- 6.2. Types of Data
- 6.3. Evolution of Computing: Pre AI/ML Binary Logic System
- 6.4. Deterministic and Probabilistic Computing
- 6.5. AI for Probabilistic Problems

7. INTRODUCTION TO DATA AND PROGRAMMING WITH PYTHON

- 7.1. Familiarization with Python
- 7.2. Data Types & Variables
- 7.3. Operators
- 7.4. Control Statements
- 7.5. Function

8. AI CONCEPTS AND AI PROJECT FRAMEWORK

- 8.1. Broad vs. Narrow AI
- 8.2. Strong vs. Weak AI
- 8.3. Expert Systems in AI
- 8.4. Computer Vision
- 8.5. Natural Language Processing
- 8.6. Neural Networks
- 8.7. AI Project Framework
- 8.8. Stages of AI Project

9. QUESTION BANK

- 9.1. Introduction To Robotics
- 9.2. Robot as a System
- 9.3. Concepts in Robotics
- 9.4. Arduino Programming
- 9.5. Introduction to Artificial Intelligence
- 9.6. Role of Data and Evolution of Computing
- 9.7. Data and Programming with Python
- 9.8. AI Concepts and AI Project Framework

Robotics

Overview of Syllabus

1. Introduction to Robotics

(i) Understanding Robots.

Basic understanding of what a robot is; definition and characteristics; benefits of using robots (with respect to humans): increased quality, increased productivity, increased efficiency, longer working span, working in hazardous environments, improved workplace; Limitations.

(ii) Evolution of Robots; Laws of Robotics.

Brief history of Robots with respect to their evolution from 1900's till date. Definition of Robotics, the three Laws of Robotics by Isaac Asimov (statements only).

(iii) Classification of Robots.

Classification of Robots as: field/terrain based (aerial, ground, underwater) and control based (manual, automatic); Meaning and examples of each. Bio-inspired robots: meaning, purpose and examples (humanoids, birds, snakes and insects).

(iv) Real world Robots and their applications.

Application of robots in different fields (domestic, industry, medical, defense, entertainment and agriculture) with at least one example of each.

2. Robot as a System

(i) Building blocks of Robots.

General block diagram of a robot. A detailed study of the building blocks of a robot. Concept of a robot as having mechanical, electronic and computational blocks; functioning and working principle of each block. Design aspects using examples of humanoid, aerial, underwater and mobile robots.

(ii) Identification of Robots.

Identification of robots (through demonstration/ video/graphic details). Illustration using an industrial robot (e.g., Industrial Robotic Arm), humanoid and mobile robot. The idea that a mechanical body can be of any form must be emphasized.

3. Concepts in Robotics

(i) Types of motion; motion in one-dimension and two-dimension; types of joints and links.

Types of motion (linear, angular, and circular); a brief understanding of motion in one-dimension and two-dimension; types of joints (prismatic, revolute, and spherical); types of links (rigid and soft). Relevant examples for each of the above.

(ii) Using links and joints to create specific motion.

A detailed study of how links and joints help create specific motion. Identification of links and joints used in a given system. Examples for the demonstration can include Industrial Robot Arms.

(iii) Degree of freedom of a robot

Definition; identification through illustration.



