XRobotics Syllabus for Class IX – ICSE Board Guided

- **Module 1: Introduction to Robotics and robots?**
- Benefits and Evolution of Robotics
- Concepts in Robotics
- Concepts of Robotics & AI: Ethical consideration
- **Project Work: Development of AI Using MIT Inventor (Open-Source Platform)**
- **Assignment 1 – Manual Robotics to learn integration of hardware into Robotics system**

(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.

(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 (arial, 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.

- **Module 2: Building blocks of Robots**
- Concept of Robots using All Mechanical, Electrical and Computational block
- Identification of Robots
- Illustration of Industrial Robots
- Project Work: Development of Manual BOT

- **Assignment 2 – Encryption and Cryptography concept test**
- Test for Robotics concept – **Practical Project to demonstrate types of Robots**

(i) Building blocks of Robots.

General block diagram of a robot. A detailed study of the building blocks of a robot.

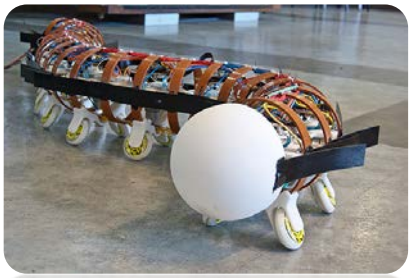
Concept of a robot as having mechanical, electronic and computational blocks; functioning and–working principle of each block. Design aspects using examples of humanoid, aerial, underwater and mobile robots.

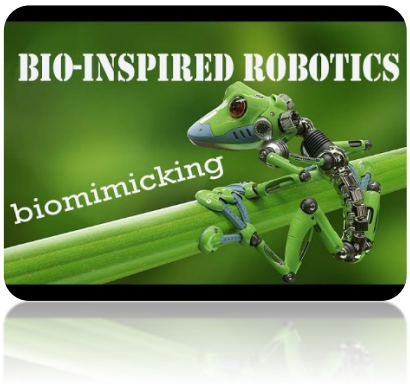
(ii) Identification of Robots.

Identification of robots (through demonstration/ video/graphic details).

Illustration using an industrial robot (e.g., Industrial Robotic Arm), humanoid and

- Module 3: Classification of Robots
- Real world robots and its applications
- Aerial Robot
- Ground based Robot
- Control based Robot (Manual, Autonomous)
- Bio Inspired Robot with Example project to learn how to build
- **Project work:** Reptile Design (Bio Inspired Robot Development) – 3D Design, 3D printing, Circuitry building and testing the final outcome.





- Robots in day-to-day life and Implementation of Automation

- Assignment 3: Classification of robotics system **(Practical + Theoretical)**

- Module 4: Robots as a system
- General block diagram of a robot.
- Concept of a robot as having mechanical systems
- Concept of a robot as having Electronic Systems
- Concept of a robot as having Computational block
- Functioning and working principle of each block.
- Design aspects of Robotics System.
- **DOF based Robotics Design Concept – Assignment (Tinker CAD + Design Software)**

(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.

- Module 5: Identification of Robots.
- Illustration using an industrial robot
- **Robotics Arms project to understand Degree of Freedom in Robotics**
- Link Join 3D design Project to replicate motion and also to create Translatory motion in Robotics structure.
- Project work: Building a Line Following Robot
- Logical Practical Session: follow the simple line pattern **to solve MAZE Problem**

- Module 6: Ethical considerations in Robotics & AI
- Sensors used in Robotics
- Programming Session: To understand the Senser Interfacing.
- Project work: Controlling **Sensors Input with UI & Hardware based Projects**

Additional Sessions:

- **20 + Practical Projects to elaborate complete syllabus for Class IX**