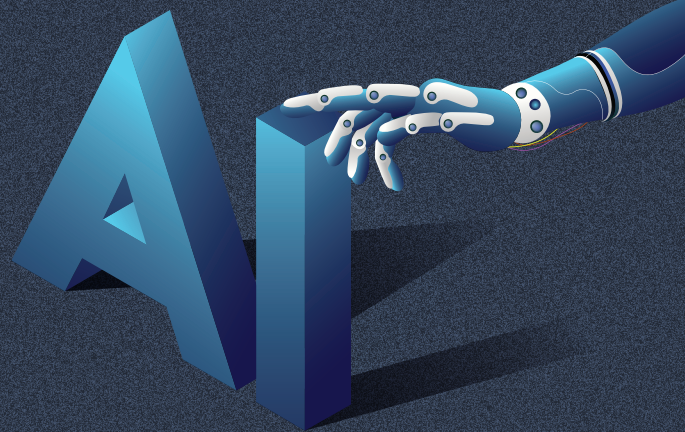Class IX

DECODING
ARTIFICIAL INTELLIGENCE

Dr. Sachin Gupta
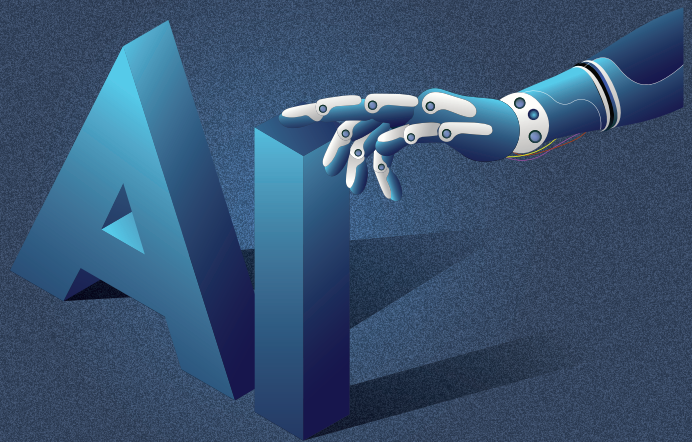Dr. Bhoomi Gupta

AI

Class IX

DECODING
ARTIFICIAL
INTELLIGENCE

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PREFACE

Artificial Intelligence is no longer a futuristic concept but an integral part of our daily lives, shaping everything from how we communicate to how we make decisions. Whether through self-driving cars, virtual assistants like Siri and Alexa or streaming platforms that predict our preferences, AI is everywhere. In this ever-changing landscape, understanding AI is no longer optional—it is essential for every student. By building a strong foundation of AI concepts, students will be better equipped for a future rich with career opportunities in fields like data science, machine learning, robotics and AI research.

Welcome to the thoroughly revised edition of **Decoding Artificial Intelligence** for **CBSE Class IX**. The book is tailored to the updated CBSE curriculum and is designed to be a delightful introduction to the world of AI in an engaging and accessible way. With a focus on real-life applications and interactive learning, this book aims to make complex AI topics understandable for the learners.

The book has been divided into five key units and provides a clear understanding of the AI project cycle while encouraging thoughtful reflection on AI's societal impact. You will learn how to handle and interpret data, gaining skills necessary to work with various datasets and understand their implications. The much-awaited essential mathematical concepts—statistics and probability—which form the backbone of AI, will prepare you for more advanced AI concepts. You will also explore the cutting-edge field of generative AI, understanding how AI can create new content, such as images, text and music, pushing the boundaries of creativity and technology. Python language foundations have been covered in detail to help you learn how to write simple Python programs and understand how they contribute to AI solutions.

The book adheres strictly to the CBSE curriculum, covering both Employability Skills and Subject-Specific Skills. Each unit includes:

- Real-life examples to explain fundamental concepts
- Clear illustrations to enhance comprehension
- AI insights to simplify complex terms
- Interactive online resources for hands-on learning
- A variety of exercises, including Objective and Subjective Type Questions, and practical projects
- Python code samples and exercises to lay the foundations of programming proficiency

As educators, our aim is to equip you with the knowledge and skills to thrive in a world shaped by Artificial Intelligence. We hope this book inspires you to think critically and creatively as you explore the world of AI. We welcome your feedback as we continue to improve and refine this educational resource.

We are grateful to our publishers, **Sultan Chand & Sons (P) Ltd**, for their continued support in bringing this book to life.

Happy learning!

AUTHORS

Syllabus
ARTIFICIAL INTELLIGENCE (Code No. 417)
CLASS IX
Total Marks: 100 (Theory 50 + Practical 50)

	Units	No. of Hours for Theory and Practical	Max. Marks for Theory and Practical
	EMPLOYABILITY SKILLS		
	Unit 1: Communication Skills–I	10	2
	Unit 2: Self-Management Skills–I	10	2
PART A	Unit 3: ICT Skills–I	10	2
	Unit 4: Entrepreneurial Skills–I	15	2
	Unit 5: Green Skills–I	05	2
	Total	**50**	**10**
	SUBJECT-SPECIFIC SKILLS	**Theory (in Hours)** / **Practical (in Hours)**	**Marks**
	Unit 1: AI Reflection, Project Cycle and Ethics	30 / 25	10
	Unit 2: Data Literacy	22 / 28	10
PART B	Unit 3: Maths for AI (Statistics & Probability)	12 / 13	07
	Unit 4: Introduction to Generative AI	08 / 12	05
	Unit 5: Introduction to Python	01 / 09	08
	Total	**160**	**40**
	PRACTICAL WORK		
	Unit 5: Introduction to Python **Practical File (minimum 15 programs)**		15
PART C	**Practical Examination** • Simple programs using input and output function • Variables, Arithmetic Operators, Expressions, Data Types • Flow of control and conditions • Lists *Any 3 programs based on the above topics*		15
	Viva Voce		5
	Total		**35**
PART D	**Project Work / Field Visit / Student Portfolio** *relate it to Sustainable Development Goals*		15
	Total		**15**
	GRAND TOTAL	**210**	**100**

DETAILED CURRICULUM/TOPICS FOR CLASS IX:
Part A: Employability Skills

S.No.	Units	Duration of Hours
1.	Unit 1: Communication Skills–I	10
2.	Unit 2: Self-Management Skills–I	10
3.	Unit 3: Information and Communication Technology Skills-I	10
4.	Unit 4: Entrepreneurial Skills–I	15
5.	Unit 5: Green Skills–I	05
	Total	**50**

Note: Detailed curriculum/ topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

Part B: (Subject-Specific Skills)

1.	Unit 1: AI Reflection, Project Cycle and Ethics
2.	Unit 2: Data Literacy
3.	Unit 3: Maths for AI (Statistics & Probability)
4.	Unit 4: Introduction to Generative AI
5.	Unit 5: Introduction to Python

UNIT 1: AI Reflection, Project Cycle and Ethics		
SUB-UNIT	**LEARNING OUTCOMES**	**SESSION / ACTIVITY / PRACTICAL**
AI REFLECTION	To identify and appreciate Artificial Intelligence and describe its applications in daily life	Session: Introduction to AI and setting up the context of the curriculum
		• Recommended Activity: Make a statement about lighting and LUIS will interpret and adjust the house accordingly *https://aidemos.microsoft.com/luis/demo*
	To recognize, engage and relate with the three realms of AI: Computer Vision, Data Statistics and Natural Language Processing	Recommended Activity: The AI Game • Learners to participate in three games based on different AI domains — Game 1: Rock, Paper and Scissors (based on data) *https://next.rockpaperscissors.ai/* — Game 2: Semantris (based on Natural Language Processing – NLP) *https://research.google.com/semantris/* — Game 3: Quick Draw (based on Computer Vision – CV) *https://quickdraw.withgoogle.com/*
AI PROJECT CYCLE	To identify the AI Project Cycle framework	Session: Introduction to AI Project Cycle • Problem Scoping • Data Acquisition • Data Exploration • Modeling • Evaluation • Deployment
	To learn problem scoping and ways to set goals for an AI project	Session: Problem Scoping Activity: Brainstorm around the theme provided and set a goal for the AI project • Discuss various topics within the given theme and select one • Fill in the 4Ws problem canvas and a problem statement to learn more about the problem identified in the community/ society • List down/ Draw a mind map of problems related to the selected topic and choose one problem to be the goal for the project
	To identify stakeholders involved in the problem scoped. Brainstorm on the ethical issues involved around the problem selected	Activity: To set actions around the goal • List down the stakeholders involved in the problem • Search on the current actions taken to solve this problem • Think around the ethics involved in the goal of your project
	To understand the iterative nature of problem scoping for in the AI project cycle Foresee the kind of data required and the kind of analysis to be done	Activity: Data and Analysis • What are the data features needed? • How will the features collected affect the problem? • Where can you get the data? • How frequent do you have to collect the data? • What happens if you don't have enough data? • What kind of analysis needs to be done? • How will it be validated? • How does the analysis inform the action?
	Share what the students have discussed so far	Presentation: Presenting the goal, actions and data Teamwork Activity: • Brainstorming solutions for the problem statement

To identify data requirements and find reliable sources to obtain relevant data	Session: Data Acquisition Activity: Introduction to data and its types • Students work around the scenarios given to them and think of ways to acquire data Activity: Data Features • Identifying the possible data features affecting the problem Activity: System Maps • Creating system maps considering data features identified
To understand the purpose of Data Visualization	Session: Data Exploration/ Data Visualization • Need of visualizing data • Ways to visualize data using various types of graphical tools Quiz Time
To use various types of graphs to visualize acquired data	Recommended Activities: Let's use Graphical Tools • Selecting an appropriate graphical format and presenting the graph sketched • Understanding graphs using *https://datavizcatalogue.com/* • Listing of newly learnt data visualization techniques • Top 10 Song Prediction: Identify the data features, collect the data and convert into graphical representation. • Collect and store data in a spreadsheet and create some graphical representations to understand the data effectively
To understand modeling (Rule-based & Learning-based)	Session: Modeling • Introduction to modeling and types of models (Rule-based & Learning-based)
To understand various evaluation techniques	Session: Evaluation Learners will understand about new terms • True Positive • False Positive • True Negative • False Negative
Challenge students to think about how they can apply their knowledge of deployment in future AI projects and encourage them to continue exploring different deployment methods	Session: Deployment Recommended Case Study: Preventable Blindness Activity: Implementation of AI project cycle to develop an AI Model for Personalized Education
To understand and reflect on the ethical issues around AI	Session: Ethics Video Session: Discussing about AI Ethics Recommended Activity: Ethics Awareness • Students play the role of major stakeholders, and they have to decide what is ethical and what is not for a given scenario • Students to explore Moral Machine • (*https://www.moralmachine.net/*) to understand more about the impact of ethical concerns
To gain awareness around AI bias and AI access	Session: AI Bias and AI Access • Discussing about the possible bias in data collection • Discussing about the implications of AI technology
To let the students analyze the advantages and disadvantages of Artificial Intelligence	Recommended Activity: Balloon Debate • Students divide in teams of 3 and 2 teams are given same theme. One team goes in affirmation to AI for their section while the other one goes against it • They have to come up with their points as to why AI is beneficial/ harmful for the society

UNIT 2: DATA LITERACY		
SUB-UNIT	**LEARNING OUTCOMES**	**SESSION / ACTIVITY / PRACTICAL**
Basics of data literacy	• To define data literacy and recognize its importance • To understand how data literacy enables informed decision-making and critical thinking • To apply the Data Literacy Process Framework to analyze and interpret data effectively • To differentiate between Data Privacy and Security • To identify potential risks associated with data breaches and unauthorized access • To learn measures to protect data privacy and enhance data security	Session: Basics of data literacy • Introduction to Data Literacy • Impact of Data Literacy • How to become Data Literate? • What are data security and privacy? How are they related to AI? • Best Practices for Cyber Security Recommended Activity: Impact of News Articles Reference Videos: • *https://www.youtube.com/watch?v=yhO_t-c3yJY* • *https://www.youtube.com/watch?v=aO858HyFbKI* • *https://www.cbse.gov.in/cbsenew/documents/Cyber%20 Safety.pdf*

Acquiring Processing, and Interpreting Data	• To determine the best methods to acquire data • To classify different types of data and enlist different methodologies to acquire it • To define and describe data interpretation • To enlist and explain the different methods of data interpretation • To recognize the types of data interpretation • To realize the importance of data interpretation	Session: Acquiring Data, Processing, and Interpreting Data • Types of data • Data Acquisition/Acquiring Data • Best Practices for Acquiring Data • Features of data and Data Preprocessing • Data Processing and Data Interpretation • Types of Data Interpretation • Importance of Data Interpretation Recommended Activities: • Trend analysis • Visualize and Interpret Data
Project Interactive Data Dashboard & Presentation	• To recognize the importance of data visualization • To discover different methods of data visualization	Session: Project Interactive Data Dashboard & Presentation • Data visualization Using Tableau Reference Links • *https://public.tableau.com/en-us/s/download* • *https://www.datawrapper.de/* Video Links: • *https://www.youtube.com/watch?v=NLCzpPRCc7U* • *https://www.youtube.com/watch?v=_M8BnosAD78*

UNIT 3: MATHS FOR AI (Statistics & Probability)		
SUB-UNIT	**LEARNING OUTCOMES**	**SESSION / ACTIVITY / PRACTICAL**
Importance of Maths for AI	To analyze the data in the form of numbers/ images and find the relation/pattern between them Use of Maths in AI	Session: Importance of Maths for AI • Finding patterns in numbers and images. • Uses of Maths — Statistics — Linear Algebra — Probability — Calculus
	To understand number patterns, picture analogy	Activity: • To observe the number pattern and find the missing number • To find connections between sets of images and use that to solve problems
Statistics	To understand the concept of Statistics in real life	Session: • Definition of Statistics • Applications — Disaster Management — Sports — Diseases Prediction — Weather Forecast
	Application in various real-life scenarios	Activity: Uses of Statistics in daily life • Students will explore the applications of statistics in real life. They may collect data and apply various statistical measures to analyze the data. Activity: Car Spotting and Tabulating Purpose: To implement the concept of data collection, analysis and interpretation Activity Introduction: • In this activity, students will be engaged in data collection and tabulation • Data collection plays a key role in Artificial Intelligence as it forms the basis of statistics and interpretation by AI • This activity will also require students to answer a set of questions based on the recorded data
Probability	To understand the concept of Probability in real life and explore various types of events	Session: Introduction to Probability • How to calculate the probability of an event • Types of events • Understand the concept of Probability using a relatable example Exercise: Identify the type of event
	Application in various real-life scenarios	Session: Applications of Probability • Sports • Weather Forecast • Traffic Estimation Exercise: Revision time

UNIT 4: INTRODUCTION TO GENERATIVE AI		
	LEARNING OUTCOMES	**SESSION / ACTIVITY / PRACTICAL**
	Students will be able to define Generative AI & classify different kinds	Recommended Activity: • Guess the Real Image vs the AI-generated image
	• Students will be able to explain how Generative AI works and recognize how it learns	Session: • Introduction to Generative AI • Generative AI vs Conventional AI
		Session: • Types of Generative AI • Examples of Generative AI
		Session: • Benefits of using Generative AI • Limitations of using Generative AI
	• Applying Generative AI tools to create content • Understanding the ethical considerations of using Generative AI	Recommended Activities: • Hands-on Activity: GAN Paint • Generative AI tools
		Session: • Ethical considerations of using Generative AI

UNIT 5: INTRODUCTION TO PYTHON		
	LEARNING OUTCOMES	**SESSION / ACTIVITY / PRACTICAL**
	To learn basic programming skills through gamified platforms	Recommended Activity: • Introduction to programming using Online Gaming portals like Code Combat
	To acquire introductory Python programming skills in a very user-friendly format	Session: • Introduction to Python language • Introducing Python programming and its applications
		Theory + Practical: Python Basics • Students go through lessons on Python Basics (Variables, Arithmetic Operators, Expressions, Comparison Operators, Logical operators, Assignment Operators, Data Types – integer, float, strings, type conversion, using print() and input() functions) • Students will try some simple problem-solving exercises on Python Compiler
		Practical: Flow of control and conditions 1. Students go through lessons on conditional and iterative statements (*if*, *for* and *while*) 2. Students will try some basic problem-solving exercises using conditional and iterative statements on Python Compiler
		Practical: Python Lists 3. Students go through lessons on Python Lists (Simple operations using list) 4. Students will try some basic problem-solving exercises using lists on Python Compiler

Part C: Practical Work

UNIT 5: INTRODUCTION TO PYTHON: Suggested Program List

PRINT	• To print personal information like Name, Father's Name, Class, School Name • To print the following patterns using multiple print commands— • To find square of number 7 • To find the sum of two numbers 15 and 20 • To convert length given in kilometres into metres • To print the table of 5 up to five terms • To calculate Simple Interest if the principal_amount = 2000, rate_of_interest = 4.5, time = 10

INPUT	• To calculate Area and Perimeter of a rectangle • To calculate Area of a triangle with Base and Height • To calculate average marks of 3 subjects • To calculate discounted amount with discount % • To calculate Surface Area and Volume of a Cuboid

LIST	• Create a list in Python of children selected for Science quiz with the names—Arjun, Sonakshi, Vikram, Sandhya, Sonal, Isha, Kartik
	  Perform the following tasks on the list in sequence—
	  — Print the whole list
	  — Delete the name "Vikram" from the list
	  — Add the name "Jay" at the end
	  — Remove the item which is at the second position
	• Create a list num = [23,12,5,9,65,44]
	  — print the length of the list
	  — print the elements from second to fourth position using positive indexing
	  — print the elements from position third to fifth using negative indexing
	• Create a list of first 10 even numbers, add 1 to each list item and print the final list.
	• Create a list List_1 = [10,20,30,40]. Add the elements [14,15,12] using extend function. Now sort the final list in ascending order and print it.

IF, FOR, WHILE	• Program to check if a person can vote • To check the grade of a student • Input a number and check if the number is positive, negative or zero and display an appropriate message • To print first 10 natural numbers • To print first 10 even numbers • To print odd numbers from 1 to n • To print sum of first 10 natural numbers • Program to find the sum of all numbers stored in a list
Important Links	• *https://cbseacademic.nic.in/web_material/Curriculum21/publication/secondary/Python_Content_Manual.pdf* • *https://drive.google.com/drive/folders/1qRAckDculA5i164OUFDlilxb8mT65MMb*

PART D: Project Work / Field Visit / Student Portfolio (*relate it to Sustainable Development Goals)
SUGGESTED PROJECTS / FIELD VISIT / PORTFOLIO (ANY ONE HAS TO BE DONE)

Suggested Projects	1. Create an AI Model using tools like:
	  — Teachable Machine (*https://teachablemachine.withgoogle.com/*)
	  — Machine Learning for Kids (*https://machinelearningforkids.co.uk/*)
	2. Choose an issue that pertains to the objectives of sustainable development and carry out the actions listed below.
	  — To understand more about the problem identified, create a 4Ws Problem Canvas.
	  — To identify the data features and create a system map to understand relationship between them
	  — To visualize the data collected graphically (Spreadsheet software to be used to store and visualize the data)
	  — Suggest an AI enabled solution to it (Prototype/Research Work)

Suggested Field Visit	Visit to an industry or IT company or any other place that is creating or using AI applications and present the report for the same. Visit can be on physical or virtual mode.
Suggested Student Portfolio	Maintaining a record of all AI activities and projects (For example, Letter to Future Self, Smart Home Floor Plan, Future Job Advertisement, Research Work on AI for SDGs and AI in Different Sectors, 4Ws canvas, System Map). (Minimum 5 Activities)

CONTENTS

SUBJECT-SPECIFIC SKILLS