

DECODING ARTIFICIAL INTELLIGENCE

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PREFACE

“I believe AI is going to change the world more than anything in the history of humanity. More than electricity.”
—Kai-Fu Lee, AI Expert

Congratulations on choosing a book that bridges the fascinating world of Artificial Intelligence with the structured learning framework of the CBSE curriculum! AI is not merely a subject—it is a transformative force, reshaping industries, societies and human potential. Remember, AI is crafted by human ingenuity, guided by human ethics and destined to elevate human capabilities.

Decoding Artificial Intelligence for Class XI (843), fully aligned with the latest CBSE syllabus, is designed to demystify complex concepts while igniting curiosity. It blends theory with hands-on practice, ensuring you grasp both the ‘why’ and the ‘how’ of AI. Whether you are analyzing data, coding in Python or exploring Machine Learning, this book will be your companion in mastering skills that define the future.

What Makes This Book Unique

- **Real-World Relevance:** Each chapter connects theoretical principles to practical applications—from designing chatbots to ethical debates on AI bias. Case studies and industry examples illustrate how AI solves real-world problems.
- **Hands-On Learning:** A lot of hands-on learning with suggested experiments include coding a regression model, building a sentiment analysis tool and creating an empathy map for a capstone project. Step-by-step solutions guide you through Python programming, data visualization and machine learning tasks.
- **Viva-Voce Ready:** Critical thinking questions like ‘*How would you reduce/prevent bias in an AI system*’ or ‘*Explain the ethical implications of facial recognition*’ prepare you for deeper insights and discussions.
- **Simplified Complexity:** Analogies like ‘*Neural networks mimic the human brain’s learning process*’ break down advanced topics. *Jargon Alerts* clarify terms like ‘ETL Process’, ‘Machine Learning Pipelines’, etc.
- **Interactive Resources:** Access datasets, coding templates and video tutorials to experiment with AI tools like TensorFlow, scikit-learn and Dialogflow.
- **Ethics at the Core:** Explore the five pillars of AI ethics through role-play activities and policy analysis, ensuring you understand technology’s societal impact.

Why This Book Matters

The CBSE curriculum emphasizes not just technical proficiency but also critical thinking and creativity. This book mirrors that vision. You will design capstone projects aligned with Sustainable Development Goals, analyze data trends and debate AI’s role in healthcare and climate change. By the end of the book, you will be equipped to innovate, question and contribute to an AI-driven world responsibly.

Our gratitude extends to educators who inspired this book’s pedagogical approach and to **Sultan Chand & Sons (P) Ltd** for their tremendous support. We welcome feedback to further refine this resource, ensuring it remains a beacon for future learners.

Dive in, experiment fearlessly and remember that AI is your tool to shape tomorrow. Let us build a future where technology amplifies humanity’s best.

AUTHORS

Syllabus

ARTIFICIAL INTELLIGENCE (Code No. 843)

CLASS XI

Total Marks: 100 (Theory 50 + Practical 50)

	UNITS	NO. OF HOURS (Theory and Practical)		MAX. MARKS (Theory and Practical)	
PART A	EMPLOYABILITY SKILLS				
	Unit 1 : Communication Skills-III	15		2	
	Unit 2 : Self-Management Skills-III	10		2	
	Unit 3 : ICT Skills-III	15		2	
	Unit 4 : Entrepreneurial Skills-III	10		2	
	Unit 5 : Green Skills-III	10		2	
	Total	60		10	
PART B	SUBJECT-SPECIFIC SKILLS		Theory	Practical	
	Unit 1 : Introduction: Artificial Intelligence for Everyone		4	10	4
	Unit 2 : Unlocking your Future in AI		6	10	5
	Unit 3 : Python Programming		10	20	5
	Unit 4 : Introduction to Capstone Project		6	15	5
	Unit 5 : Data Literacy—Data Collection to Data Analysis		6	15	6
	Unit 6 : Machine Learning Algorithms		9	15	6
	Unit 7 : Leveraging Linguistics and Computer Science		5	10	5
	Unit 8 : AI Ethics and Values		4	5	4
Total		50	100	40	
PART C	PRACTICAL WORK / PROJECT WORK				
	IBM Skills Build Certification/Any other industry certification				5
	Capstone Project				12
	Bootcamps/ Internship/Other startups				7
	Practical File				10
	Lab Test/ Written Exam (based on practical file)				10
	Viva Voce (based on practical file and project)				6
	Total				50
GRAND TOTAL				100	

DETAILED CURRICULUM/TOPICS FOR CLASS XI:

Part A: Employability Skills

S.No.	UNITS	DURATION IN HOURS
1.	Unit 1: Communication Skills-III	15
2.	Unit 2: Self-Management Skills-III	10
3.	Unit 3: Basic Information and Communication Technology Skills-III	15
4.	Unit 4: Entrepreneurial Skills-III	10
5.	Unit 5: Green Skills-III	10
TOTAL		60

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

Part B: Subject-Specific Skills

Unit 1	Introduction: Artificial Intelligence for Everyone
Unit 2	Unlocking your Future in AI
Unit 3	Python Programming
Unit 4	Introduction to Capstone Project
Unit 5	Data Literacy—Data Collection to Data Analysis
Unit 6	Machine Learning Algorithms
Unit 7	Leveraging Linguistics and Computer Science
Unit 8	AI Ethics and Values

DETAILED CURRICULUM/TOPICS FOR CLASS XI

UNIT 1 - INTRODUCTION: ARTIFICIAL INTELLIGENCE FOR EVERYONE		
Learning Outcomes	Theory	Practical
<p>Students will be able to—</p> <ul style="list-style-type: none"> Communicate effectively about AI concepts and applications in written and oral formats. Describe the historical development of AI. Differentiate between various types and domains of AI, including their applications. Recognize the key terminologies and concepts related to machine learning and deep learning. Formulate informed opinions on the potential benefits and limitations of AI in various contexts. 	<ul style="list-style-type: none"> What is Artificial Intelligence? Evolution of AI Types of AI Domains of AI AI Terminologies Benefits and limitations of AI 	<ul style="list-style-type: none"> Categorize the given applications into the three domains. <p>Examples of Machine Learning & Reinforcement Learning given in the course below:</p> <p>IBM Skills Build – Introduction to AI</p>
UNIT 2 - UNLOCKING YOUR FUTURE IN AI		
Learning Outcomes	Theory	Practical
<p>Students will be able to—</p> <ul style="list-style-type: none"> Articulate the demand for AI professionals and the diverse career opportunities available in the field. Identify the requisite skills and tools needed to pursue a career in artificial intelligence. Understand the potential roles and responsibilities of AI professionals across different industries. Explore resources for further learning and skill development in the field of AI. Evaluate their own interests and skills to determine potential pathways for a career in AI. 	<ul style="list-style-type: none"> The Global Demand Some Common Job Roles In AI Essential Skills and Tools for Prospective AI Careers Opportunities in AI across Various Industries 	<ul style="list-style-type: none"> Identify ten companies currently hiring employees for in specific AI positions. Note down the technical skills and soft skills listed by any two companies for the specific AI position. <p>IBM Skills Build: Your Future in AI: The Job Landscape</p>
UNIT 3 - PYTHON PROGRAMMING		
Learning Outcomes	Theory	Practical
<p>Students will be able to—</p> <ul style="list-style-type: none"> Explain the basics of Python programming language and write programs with basic concepts of tokens. Use selective and iterative statements effectively. Gain practical knowledge on how to use the libraries efficiently. 	<p>Level 1: Basics of Python programming, character sets, tokens, modes, operators, datatypes, Control Statements</p> <p>Level 2: CSV Files, Libraries—NumPy, Pandas, Scikit-learn</p>	<ul style="list-style-type: none"> Minimum five programs to be taught using operators, data types, Control Statements (Level 1) Minimum five programs on NumPy, Pandas, Scikit-learn (Level 2) <p>IBM SkillsBuild - Python for Data Science</p>
UNIT 4 - INTRODUCTION TO CAPSTONE PROJECT		
Learning Outcomes	Theory	Practical
<p>Students will be able to—</p> <ul style="list-style-type: none"> Decompose any problem using the 5W1H method. Apply Design thinking methodology. Create empathy maps. Align problems to SDGs. Apply all the learnings in solving real world problems. Express their solution to a problem in non-technical words. 	<ul style="list-style-type: none"> Design Thinking Empathy Map Sustainable Development Goals Capstone Project 	<ul style="list-style-type: none"> Create an empathy map for a given scenario. Project Abstract Creation Using Design Thinking Framework. <p>IBM SkillsBuild - What is Design thinking?</p>

UNIT 5 - DATA LITERACY—DATA COLLECTION TO DATA ANALYSIS

Learning Outcomes	Theory	Practical
<p>Students will be able to—</p> <ul style="list-style-type: none"> • Explain the importance of data literacy in AI. • Identify different data collection methods and their applications. • Comprehend mathematical concepts related to matrices, its operations, and applications. • Apply basic data analysis techniques to analyze data. • Visualize the data using different techniques. 	<ul style="list-style-type: none"> • What is Data Literacy? • Data Collection • Exploring Data • Statistical Analysis of data • Representation of data, Python Programs for Statistical Analysis and Data Visualization • Introduction to Matrices • Data Pre-processing • Data in Modelling and Evaluation 	<ul style="list-style-type: none"> • Identification of the level of measurement. • Python programs to demonstrate the use of mean, median, mode, standard deviation and variance. • Python programs to visualise the line graph, bar graph, histogram, scatter graph and pie chart using matplotlib. rainfall.csv <p>IBM SkillsBuild - Data Visualisation with Python (Modules 1,2,3)</p>

UNIT 6 - MACHINE LEARNING ALGORITHMS

Learning Outcomes	Theory	Practical
<p>Students will be able to –</p> <ul style="list-style-type: none"> • Differentiate the different types of machine learning methods. • They will be able to understand the concept behind each machine learning methods. • Apply these methods to develop simple solutions for some day-to-day situations. • Build up this knowledge to the next level to apply during Capstone Project development. 	<ul style="list-style-type: none"> • Machine Learning in a nutshell • Types of Machine Learning • Supervised Learning • Understanding Correlation, Regression, Finding the line, Linear Regression algorithm • Classification – How it works, Types, K – Nearest Neighbour algorithm • Unsupervised Learning • Clustering – How it works, Types, K – means Clustering algorithm 	<ul style="list-style-type: none"> • Calculation of Pearson correlation coefficient in MS Excel. • Demonstration of Linear regression in MS Excel. • Demonstration of Linear regression using Python program. (**For Advanced Learners) • Demonstration of K – Nearest Neighbour using Python program. (**For Advanced Learners) • Demonstration of K – means clustering using Python program. (**For Advanced Learners) <p>IBM SkillsBuild - Machine learning with Python</p>

UNIT 7 - LEVERAGING LINGUISTICS AND COMPUTER SCIENCE

Learning Outcomes	Theory	Practical
<p>Students will be able to –</p> <ul style="list-style-type: none"> • Develop a better understanding of the complexities of language and the challenges involved in NLP tasks. • Learn new techniques and algorithms for NLP tasks. 	<ul style="list-style-type: none"> • Understanding Human Language Complexity • Introduction to Natural Language Processing (NLP)—Emotion Detection and Sentiment Analysis, Classification Problems, Chatbot • Phases of NLP • Applications of NLP 	<ul style="list-style-type: none"> • Write an article on “IBM Project Debater – Interesting facts”. • Create a chatbot on ordering ice-creams using any of the following platforms: <ul style="list-style-type: none"> ■ Google Dialogflow ■ Botsify.com ■ Botpress.com • Program to print the POS tags of a statement. (**For Advanced Learners) • Creating a simple rule based chatbot using Python. (**For Advanced Learners) <p>IBM SkillsBuild - Natural Language Processing</p>

UNIT 8 - AI ETHICS AND VALUES		
Learning Outcomes	Theory	Practical
<p>Students will be able to –</p> <ul style="list-style-type: none"> • Demonstrate an understanding of the fundamental principles of ethics and gain insight into ethical considerations related to AI technologies. • Develop an understanding of AI bias, its sources, and its real-world implications, as well as the ethical considerations. • Identify and apply strategies for mitigating bias in AI systems to promote fairness and transparency in technology. • Recognize the significance of AI policies in promoting responsible, safe, and ethical use of AI technologies. 	<ul style="list-style-type: none"> • Ethics in Artificial Intelligence • The five pillars of AI Ethics • Bias, Bias Awareness, Sources of Bias • Mitigating Bias in AI Systems • Developing AI Policies • Moral Machine Game • Survival of the Best Fit Game 	<ul style="list-style-type: none"> • Summarize your insights and interpretations from the video "Humans need not apply." • Activity: Role Play on biased AI systems • Comparative study of AI policies (that involve examining guidelines and principles) established by various organizations and regulatory bodies. • Understanding ethical dilemma using: Moral machine Survival of the best fit <p>IBM SkillsBuild - AI Ethics</p>

Part C: Practical Work/Project Work

1. Practical File

Note: The following to be included in the Practical File

- One certification (IBM SkillsBuild (any of the courses listed above) /any other industry certification)
- At least one activity from each unit
- One participation certificate of bootcamp/internship

Unit-wise sample activities for Practical File as given below:

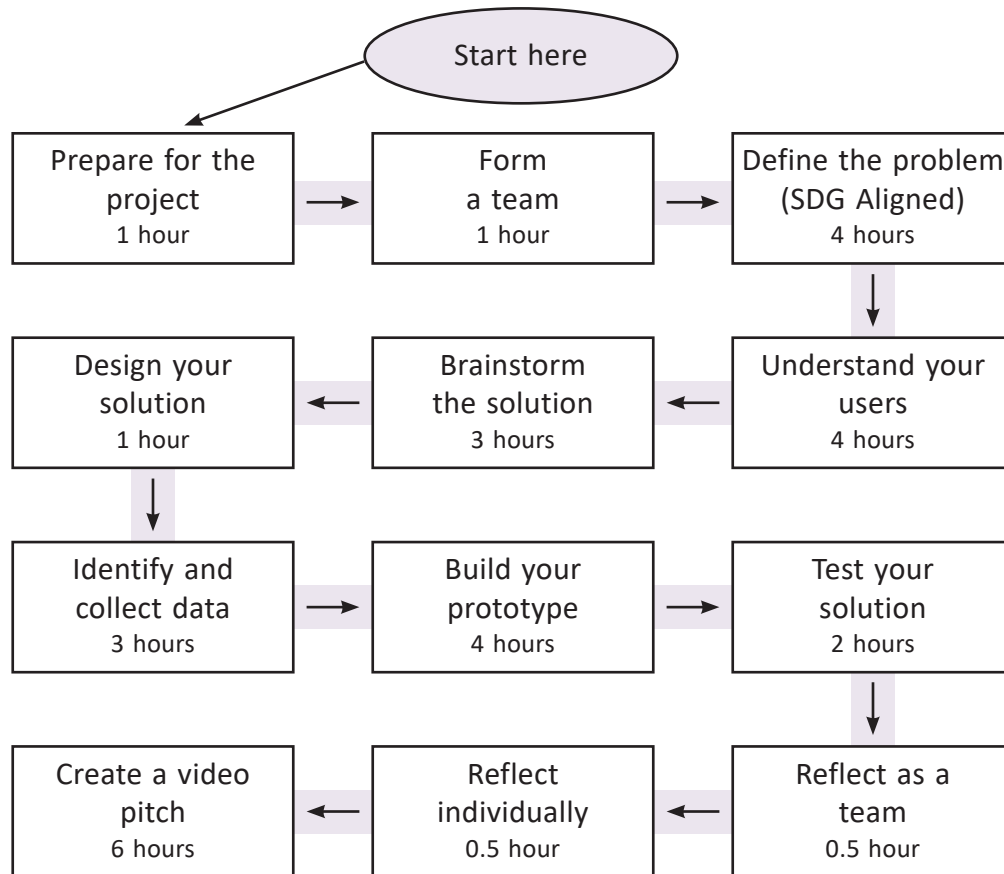
- Categorize the given applications into the three domains as given on pg. 5 of the Students Handbook.
- Identify ten companies currently hiring employees for in specific AI positions.
- Note down the technical skills and soft skills listed by any two companies for the specific AI position.
- Python programs using operators, data types, control statements (Level 1)
- Python programs on NumPy, Pandas, Scikit-learn (Level 2)
- Create an empathy map for a given scenario.
- Project Abstract Creation Using Design Thinking Framework.
- Python programs to demonstrate the use of mean, median, mode, standard deviation and variance.
- Python programs to visualise the line graph, bar graph, histogram, scatter graph and pie chart using matplotlib.
- Calculation of Pearson's correlation coefficient in MS Excel.
- Demonstration of Linear regression in MS Excel.
- Create a chatbot on ordering ice-creams using any of the following platforms:
 - Google Dialogflow
 - Botsify.com
 - Botpress.com
 - Any other online platform
- Summarize your insights and interpretations from the video "Humans need not apply."
- Comparative study of AI policies (that involve examining guidelines and principles) established by various organizations and regulatory bodies.
- Understanding ethical dilemma using
 - Moral machine
 - Survival of the best fit

Additional programs for Practice (not to be evaluated)

[Sample programs for regression, classification and clustering along with the dataset is in this link.](#)

2. Capstone Project

Project Guidelines



ARTIFICIAL INTELLIGENCE

CLASS XI

CONTENTS

EMPLOYABILITY SKILLS

1. Communication Skills–III	1–30
Introduction	1
Verbal Communication	5
Non-Verbal Communication	6
Pronunciation Basics	8
Communication Styles	11
Saying No—Refusal Skills	13
Writing Skills—Parts of Speech	15
Parts of Sentences	18
Greetings and Introduction	19
Talking about Self	20
Asking Questions	22
Talking about Family	22
Describing Habits and Routines	24
Asking for Directions	25
2. Self-Management Skills–III	31–50
Introduction	31
Know Yourself	32
Strength and Weakness Analysis	33
Grooming	35
Personal Hygiene	36
Teamwork	37
Networking Skills	39
Self-Motivation	41
Goal-Setting	42
Time Management	45
3. ICT Skills–III	51–74
Introduction	51
Basic Interface of LibreOffice Writer	55
Opening, Saving, Printing and Closing Document	58
Formatting Text in a Word Document	60
Checking Spelling and Grammar	64
Inserting Lists, Tables, Pictures and Shapes	65
Header, Footer and Page Number	68
Tracking Changes in LibreOffice Writer	68
4. Entrepreneurial Skills–III	75–100
Introduction	75
Story of an Entrepreneur	76
Entrepreneurship Defined	77
Types of Business Activities	77
Values of an Entrepreneur	79
Attitude of an Entrepreneur	81
Thinking like an Entrepreneur	83
Coming up with a Business Idea	86
Understanding the Market	89
Business Planning	93

5. Green Skills–III	101–114
Introduction	101
Focus Sectors of Green Economy	102
Policies for a Green Economy	104
Stakeholders in Green Economy	106
Government and Private Agencies	108
Answers to Objective Type Questions	115–116

SUBJECT-SPECIFIC SKILLS

1. Artificial Intelligence for Everyone	117–144
Introduction	117
Evolution of AI	120
Types of AI	121
Domains of AI	123
Data Science	124
Cognitive Computing (Perception, Learning, Reasoning)	130
AI Terminologies	132
Types of Machine Learning	134
Benefits and Limitations of AI	137
Extension Activities	139
2. Unlocking Your Future in AI	145–164
Introduction	145
Common Job Roles in AI	147
Essential Skills and Tools for Prospective AI Careers	149
Opportunities in AI Across Industries	156
3. Python Programming	165–218
Introduction	165
Origins and History	166
Design Philosophy	166
Features of Python	167
Python Editors	169
Getting Started with Python Programs	173
Program Building Units: Tokens	173
Data Types	179
Accepting Values from the User	181
Control Flow Statements in Python	183
Understanding CSV (Comma-Separated Values) File	189
Introducing Libraries	192
4. Introduction to Capstone Project	219–244
Introduction	219
Skills Learned by Working on a Capstone Project	220
Examples of Simple Capstone Projects in AI	221
Initializing Capstone Project	222
Critical and Creative Thinking	227
Introduction to Design Thinking	229
Design Thinking Framework	229
Sustainable Development Goals	236
Project Abstract Creation Template	238

5. Data Literacy—Data Collection to Data Analysis	245–294
Introduction	245
Significance of Data Literacy	245
Data Collection	246
Exploring Data	250
Statistical Analysis of Data Using Python	256
Data Visualization using Python	265
Introduction to Matrices	276
Data Preprocessing	281
Data Modelling and Evaluation	282
6. Machine Learning Algorithms	295–334
Introduction	295
Types of Machine Learning	296
Supervised Learning	297
Unsupervised Learning	320
7. Leveraging Linguistics and Computer Science	335–362
Introduction	335
Understanding Human Language Complexity	336
Introduction to Natural Language Processing (NLP)	337
Chatbots	343
Modern Chatbots Dialog Systems	345
NLP Code Examples	351
8. AI Ethics and Values	363–381
Introduction	363
Ethics in Artificial Intelligence	364
The Five Pillars of AI Ethics	365
Bias, Bias Awareness, Sources of Bias	367
Mitigating Bias in AI Systems	371
Developing AI Policies	372
Moral Machine Game	374
‘Survival of the Best Fit’ Game	376
Answers to Objective Type Questions	382
Appendices	A.1 –A.14
Appendix A: Viva Voce	A.1–A.3
Appendix B: Model Test Paper (Solved)	A.4–A.9
Appendix C: Practice Paper	A.10–A.14