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Ver. 2.1

7

Teacher's Manual

Extended Support for Teachers

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Teacher's Time Table

Periods / Days	0	I	II	III	IV	BREAK	V	VI	VII	VIII
Monday										
Tuesday										
Wednesday										
Thursday										
Friday										
Saturday										

Development Milestones in a Child

Development milestones are a set of functional skills or age-specific tasks that most children can do at a certain age. These milestones help the teacher identify and understand how children differ in different age groups.

Age
5 - 8 Years

Physical	• First permanent tooth erupts • Shows mature throwing and catching patterns • Writing is now smaller and more readable • Drawings are now more detailed, organised and have a sense of depth
Cognitive	• Attention continues to improve, becomes more selective and adaptable • Recall, scripted memory, and auto-biographical memory improves • Counts on and counts down, engaging in simple addition and subtraction • Thoughts are now more logical
Language	• Vocabulary reaches about 10,000 words • Vocabulary increases rapidly throughout middle childhood
Emotional/ Social	• Ability to predict and interpret emotional reactions of others enhances • Relies more on language to express empathy • Self-conscious emotions of pride and guilt are governed by personal responsibility • Attends to facial and situational cues in interpreting another's feelings • Peer interaction is now more prosocial, and physical aggression declines

"If you cannot do great things, do small things in a great way."

Age 9 - 11 Years

Physical	• Motor skills develop resulting in enhanced reflexes
Cognitive	• Applies several memory strategies at once • Cognitive self-regulation is now improved
Language	• Ability to use complex grammatical constructions enhances • Conversational strategies are now more refined
Emotional/ Social	• Self-esteem tends to rise • Peer groups emerge

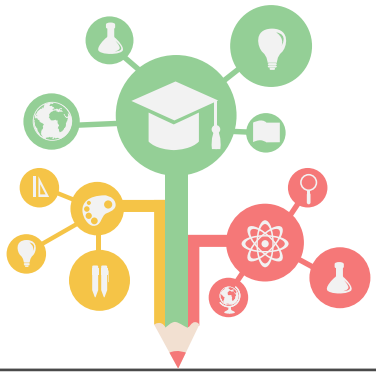
Age 11 - 20 Years

Physical	• If a girl, reaches peak of growth spurt • If a girl, motor performance gradually increases and then levels off • If a boy, reaches peak and then completes growth spurt • If a boy, motor performance increases dramatically
Cognitive	• Is now more self-conscious and self-focused • Becomes a better everyday planner and decision maker
Emotional/ Social	• May show increased gender stereotyping of attitudes and behaviour • May have a conventional moral orientation

Managing the children's learning needs according to their developmental milestones is the key to a successful teaching-learning transaction in the classroom.

"Family is the most important thing in the world."

Teaching Pedagogies



Pedagogy is often described as the approach to teaching. It is the study of teaching methods including the aims of education and the ways in which such goals can be achieved.

Lesson Plans

A lesson plan is the instructor's road map which specifies what students need to learn and how it can be done effectively during the class time. A lesson plan helps teachers in the classroom by providing a detailed outline to follow in each class.

A lesson plan addresses and integrates three key components:

- Learning objectives
- Learning activities
- Assessment to check the student's understanding

A lesson plan provides an outline of the teaching goals:

Before the class

1. Identify the learning objectives.
2. Plan the lesson in an engaging and meaningful manner.
3. Plan to assess student's understanding.
4. Plan for a lesson closure.

During the class

Present the lesson plan.

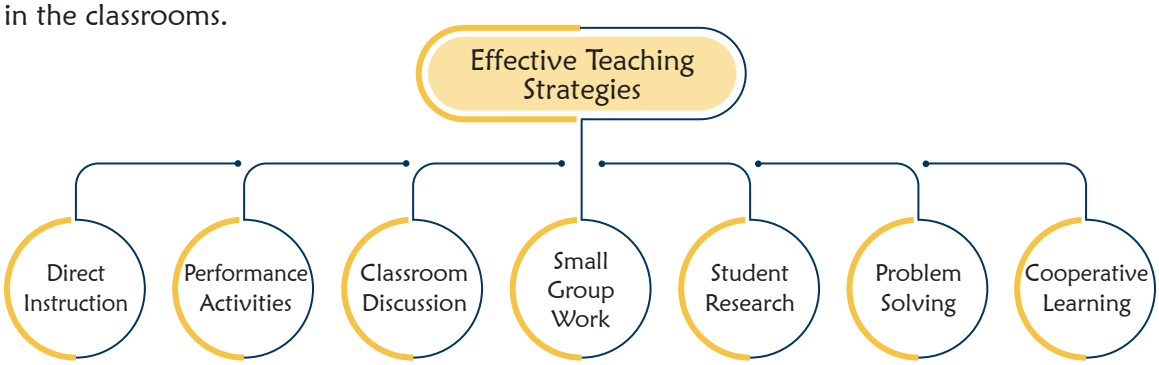
After the class

Reflect on what worked well and why. If needed, revise the lesson plan.

"Knowing yourself is the beginning of all wisdom."

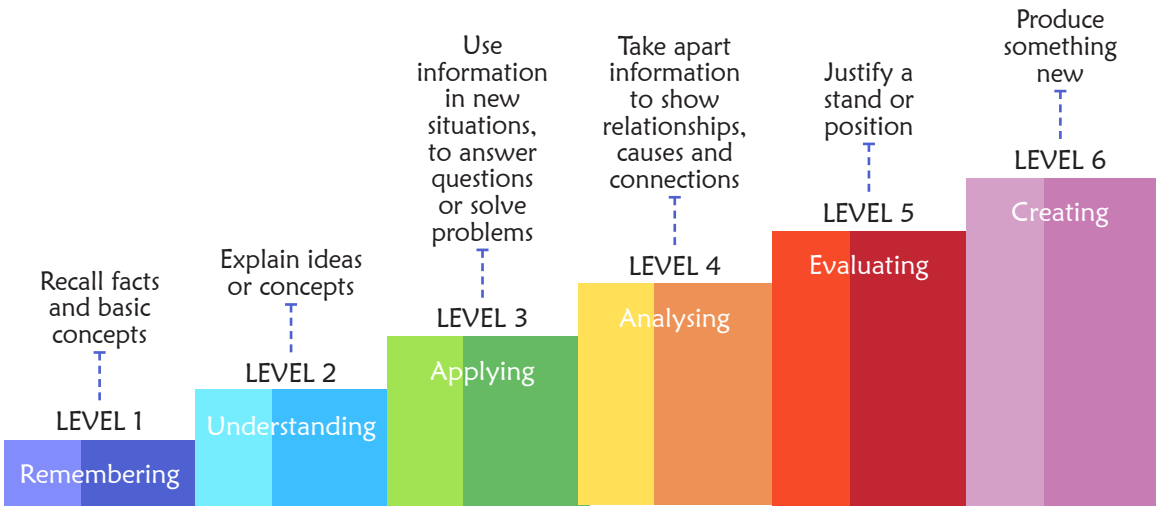
Teaching Strategies

Numerous strategies have evolved over the years to facilitate the teaching-learning process in the classrooms.



Bloom's Taxonomy

Bloom's Taxonomy was created by Dr Benjamin Bloom and several of his colleagues, to promote higher forms of thinking in education instead of rote learning. There are three domains of learning: cognitive (mental), affective (emotional), and psychomotor (physical). However, when we refer to Bloom's Taxonomy we speak of the cognitive domain. Bloom's Taxonomy is a list of cognitive skills that is used by teachers to determine the level of thinking their students have achieved. As a teacher, one should attempt to move students up the taxonomy as they progress in their knowledge.



Teachers should focus on helping students to remember information before expecting them to understand it, helping them understand it before expecting them to apply it to a new situation, and so on.

> "If you have no confidence in self, you are twice defeated in the race of life."

CLASS 7

Lesson Plan

1 Number System

Teaching Objectives

Students will learn about

- Number System
- Decimal to Binary Conversion
- Binary to Decimal Conversion
- Operations on Binary Numbers

Number of Periods	
Theory	Practical
3	0

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 7 of the main course book.

While teaching this chapter, tell the students that a number system is a collection of numbers used to describe various quantities.

Introduce base or radix as the total number of digits used in a number system.

Inform them that there are four important types of number systems—Decimal (base 10), Binary (base 2), Octal (base 8) and Hexadecimal (base 16).

Make the students recall the method of writing expanded form of a number under decimal number system.

Let the students know that:

- In binary number system, the numbers are expressed using two digits, 0 and 1, and expanded with base 2.
- In decimal number system, the numbers are expressed using ten digits, 0 to 9 and expanded with base 10.
- In octal number system, the numbers are expressed using eight digits, 0 to 7 and expanded with base 8.

- In hexadecimal number system, the numbers are expressed using fifteen digits, 0 to 9 and A to F, and expanded with base 16.

Show the students the method of converting:

- Decimal number to binary number by successive division by 2 and arranging the remainders in reverse order.
- Binary number to decimal number by multiplying digits with 2 raised to the power of place of that digit starting from 0 on the left.

Share the rules of binary addition and subtraction.

Make the students understand the method of carrying out mathematical operations on binary numbers and verifying the results by corresponding conversions to decimal numbers.

Ask the students to solve the exercise Quest given on page 12 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. What is a number system?

Q. Write the radix of decimal/binary/octal/hexadecimal number system.

Q. Which digits are used to express a decimal/binary/octal/hexadecimal number?

Q. What is decimal number system?

Q. What is binary number system?

Q. What is the value of addition of binary digits 1 and 1?

Q. What is the value of subtraction of binary digits 0 and 1?

Q. Which number system is used by computers?

Q. Which number language is known as machine language?

Q. Define octal number system.

Q. What is hexadecimal number system?

Q. Write the steps to convert a decimal number to a binary number.

Evaluation

After explaining the chapter, let the students do the exercises given on pages 13 and 14 of the main course book as Exercise. After solving the course book exercises, tell the students to solve Fun Zone given on page 15 of the main course. Ask the students to answer the questions given as Competency-based/Application-based questions on page 15 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 15 of the main course book will enhance

the ability of the students and serve as flexibility and communication activities.

Suggested Activity

Convert the last four digits of your parents' mobile numbers into binary number.

2 App Development

Teaching Objectives

Students will learn about

- What is an App?
- Types of Mobile Apps
- Downloading and Installing the App
- Defining the Android and iOS
- Categories of Apps
- Developing an App

Number of Periods	
Theory	Practical
2	3

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 16 of the main course book.

While teaching this chapter, brief the students about smartphones and technology.

Tell the students that an App is a software program primarily developed for hand-held smart devices such as mobile and tablet.

Explain to the students the difference between the Android and iOS in detail.

Demonstrate the types of Mobile Apps to the students with example, that are:

- Native Apps
- Web Apps
- Hybrid Apps

Explain the following categories of Apps to the students along with the examples:

- Gaming Apps
- Productivity Apps
- Entertainment Apps
- Utility Apps
- Educational Apps
- Social Networking Apps
- Communication Apps
- E-Commerce Apps

Explain to the students the steps involved in downloading and installing the Apps.

Explain to the students the steps involved in developing an app using App Inventor.

Ask the student to solve the exercise Quest given on page 17,19 and 29 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. What is an App?

Q. Define the following:

- Gaming Apps
- Entertainment Apps
- Educational Apps
- Communication Apps
- Productivity Apps
- Utility Apps
- Social Networking Apps
- E-Commerce Apps

Q. Name the two basic views of App Inventor.

Evaluation

After explaining the chapter, let the students do the exercises given on pages 30 and 31 of the main course book as Exercise. Tell the students to solve Fun Zone given on page 31 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based questions on page 32 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 32 of the main course book will enhance the ability of the students and serve as technology literacy and media literacy activities.

Suggested Activity

Ask the students to develop an App for reciting tables using App Inventor.

3 Advanced Features of Excel 2016

Teaching Objectives

Students will learn about

- Form in Excel
- Filtering Data
- Using Data Validation
- Using Pivot Table
- Using Form in Excel
- Conditional Formatting
- Using Subtotal Command

Number of Periods	
Theory	Practical
1	2

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 33 of the main course book.

Tell the students the use of Form command in Excel.

Demonstrate the steps involved in adding a new record, searching a record and deleting a record by using form command.

Introduce filtering as hiding unwanted data from a set of data.

Show to the students the various steps involved in applying Filters in a worksheet.

Share with the students that Filters once applied can be easily removed and tell them the method of removing filters.

Introduce Conditional Formatting as highlighting the required information.

Tell the students about basic difference between Filtering (unwanted information gets hidden) and Conditional Formatting (required information gets highlighted).

Explain the various criteria detailed under Conditional Formatting.

Demonstrate the steps involved in applying conditional formatting on a worksheet.

Demonstrate steps for applying data validation.

Show how to use the Subtotal command.

Guide students through creating a Pivot Table.

Ask the students to solve the exercise Quest given on pages 36 and 39 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. What is the of form in Excel?

Q. How can you delete a record by using form in Excel?

Q. What is the use of filtering data in Excel?

Q. How can filters be removed in a worksheet?

Q. What is the primary function of the Subtotal command in Excel?

Q. What do you understand by conditional formatting feature?

Q. How is conditional formatting different from filtering data?

Q. What is the purpose of data validation in Excel?

Q. What purpose does a Pivot Table serve in Excel?

Evaluation

After explaining the chapter, let the students do the course book exercises given on pages 44 and 45 of the main course book as Exercise. After solving the course book exercises, tell the students to solve Fun Zone activity given on page 45 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based questions on page 45 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity on page 45 of the main course book will enhance the ability of the students and serve as experiential learning and technology literacy activities.

Suggested Activity

1. Ask the students to enter their height and weight along with similar information for their nine friends. Sort the data with primary criteria as heights in ascending order and secondary criteria as weights in descending order.
2. Highlight the cells where the heights are less than the height of the student or weight is more than the weight of the student preparing the worksheet.

4 Coding and Flowchart

Teaching Objectives

Students will learn about

- Flowchart
- Disadvantages of Flowchart
- Symbols used for the Flowchart
- Advantages of Flowchart
- Principles to Draw a Flowchart
- Structure of a Flowchart

Number of Periods	
Theory	Practical
2	0

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 47 of the main course book.

Begin with introduction of algorithm as a set of steps in a sequential manner to solve a problem or to complete a task.

Let them know that a flowchart is a diagrammatic representation of the step-by-step plan.

Make the students aware of the advantages and disadvantages of a flowchart.

Explain the principles to draw a flowchart to the students.

Show the symbols used to draw a flowchart to the student.

Demonstrate to the students the structure of the flowchart with the help of examples.

Ask the students to solve the exercise Quest given on page 50 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. What is algorithm?

Q. What is a flowchart?

Q. What are the advantages of flowchart?

Q. Tell anyone disadvantage of a flowchart?

Q. What are the principles to draw a flowchart?

Q. Which symbol is used to start a flowchart.

Evaluation

After explaining the chapter, let the students do the exercises given on pages 51, 52 and 53 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 53 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based questions on page 53 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 53 of the main course book will enhance the ability of the students and serve as interdisciplinary learning and information literacy activities.

Suggested Activity

Ask the students to draw a flowchart to find the first 5 even numbers.

5 Advanced MakeCode Arcade

Teaching Objectives

Students will learn about

- What are Control Structures?
- Loops
- Jump Statements
- Functions

Number of Periods	
Theory	Practical
3	2

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 54 of the main course book.

While teaching this chapter, brief the students about Advanced MakeCode Arcade.

Explain the students about control structures and three control structures as:

- Sequential
- Selection/Conditional
- Iteration

Demonstrate the use of loops.

Ask the students about loops and tell them about different types of loops.

Demonstrate the students how to create a project using Repeat n Times Loop.

Explain the students about Forever Loop, For Loop, While Loop.

Tell the students about Jump Statements like Break and Continue.

Explain the students about the concept of Functions.

Demonstrate the students the steps to create a function.

Ask the students to solve the exercise Quest given on page 68 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. Name the three control structures.

Q. What are the three requirements for the if-else statements?

Q. Name the three most important logical operators.

Q. What does relational operators return?

Q. Define function/function parameters/array/sequence/sorting.

Q. Which method is used in Python to search an element in an array?

Q. How can you remove an item in an array?

Evaluation

After explaining the chapter, let the students do the exercises given on pages 69 and 70 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 71 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based questions on page 71 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 72 of the main course book will enhance the ability of the students and serve as critical thinking and interdisciplinary activities.

Suggested Activity

Ask the students to create program in MakeCode Arcade to find square of a given number.

6 Fields Where Robots are Used

Teaching Objectives

Students will learn about

- Security and Surveillance
- Military
- Cooking
- Space Exploration
- Manufacturing
- Customer Service
- Healthcare
- Entertainment

- Agriculture
- Underwater Research

Number of Periods	
Theory	Practical
2	0

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 73 of the main course book.

While teaching this chapter, tell the students that robots are assigned to specific tasks.

Make them understand that robots are used in different fields which are:

- Security and Surveillance
- Military
- Cooking
- Space Exploration
- Agriculture
- Manufacturing
- Customer Service
- Healthcare
- Entertainment
- W• Underwater Research

Ask the student to solve the exercise Quest given on pages 74, 77 and 79 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. How are robots being used as security guards?

Q. Name a robot used in space exploration and mention its mission.

Q. How are robots used in the entertainment industry?

Q. What tasks can robotic arms perform in manufacturing industries?

Q. Give an example of a humanoid robot used in customer service.

Q. How can chef robots help with cooking?

Q. What are some applications of surgical robots in healthcare?

Q. What are some tasks that agriculture robots can perform?

Q. Name a robot used for underwater research and its purpose.

Evaluation

After explaining the chapter, let the students do the exercises given on pages 80, 81 and 82 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 82 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based question on page 82 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 83 of the main course book will enhance the ability of the students and serve as art integration learning and productivity & accountability activities.

Suggested Activity

Ask the students to explore the world of robotics and build their own robot using simple materials.

Some of the materials they can use are:

- Cardboard or sturdy paper
- Craft supplies (markers, colored pencils, scissors, glue, tape)
- Optional: Additional materials for embellishments (pipe cleaners, googly eyes, buttons, etc.)
- Optional: Small motor or battery-operated toy.

7 Exploring Math with Coding

Teaching Objectives

Students will learn about

- Logical Operators
- If Else Conditional Statements in Coding
- Program to Find the Greatest Number
- Types of Angles
- Relational Operators
- Program to Check Odd and Even Number
- Angles
- Program to Find the Type of Angle

Number of Periods	
Theory	Practical
2	2

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 88 of the main course book.

While teaching this chapter, tell the students that coding can be an excellent tool for solving math problems since it involves logical instructions and pinpoint accuracy.

Tell the students about logical operators and relational operators.

Introduce the blocks of logical operators and relational operators used in AI Connect.

Explain the concept of conditional statements and the blocks of conditional statements in AI Connect.

Demonstrate the AI Connect programs to check odd and even number, and to find the greatest number.

Introduce the topic of angles and types of angles.

Demonstrate the AI Connect program to find the type of angle.

Ask the student to solve the exercise Quest given on page 92 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. Name any three logical operators.

Q. Define relational operators.

Q. How does conditional statements helps us?

Q. The input with prompt block is present under which block category in AI Connect?

Q. Define Angle.

Q. What is the highest possible degree of angle?

Evaluation

After explaining the chapter, let the students do the exercises given on pages 96 and 97 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 97 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based question on page 97 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 97 of the main course book will enhance the ability of the students and serve as critical thinking and interdisciplinary learning activities.

Suggested Activity

Ask the students to create a program in AI Connect to check whether the given number is multiple of 5 or not.

8 Exploring Science with Coding-1

Teaching Objectives

Students will learn about

- Speed
- Average Speed
- Basic Mathematical Operators
- Total Distance Covered by a Vehicle
- Find the Electricity Bill

Teaching Plan

Number of Periods	
Theory	Practical
2	3

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 98 of the main course book.

While teaching this chapter, tell the students that time, speed and distance are major concepts in Science.

Explain the concept of speed.

Show the students about the relation between time, speed and distance.

Tell the students about average speed.

Show the basic mathematical operator blocks to the students.

Explain the use of basic mathematical operator blocks to the students.

Demonstrate the AI Connect programs to find the total distance covered by a vehicle and to find the electricity bill.

Ask the student to solve the exercise Quest given on page 106 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. Define Speed.

Q. What is the relationship between time, speed and distance?

Q. What is average speed?

Q. Name any five basic mathematical operator blocks.

Q. What is the use of modulus operator block?

Evaluation

After explaining the chapter, let the students do the exercises given on page 107 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 108 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based question on page 108 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 108 of the main course book will enhance the ability of the students and serve as critical thinking and interdisciplinary learning activities.

Suggested Activity

Ask the students to create a program in AI Connect to find the speed of a vehicle and take distance and time as input from the user.

9 Exploring Science with Coding-2

Teaching Objectives

Students will learn about

- Temperature
- Clinical Thermometer
- Program to Know the Room Temperature

- pH Value
- Program to Determine the Type of Solution
- Force
- Program to Calculate the Force

Number of Periods	
Theory	Practical
2	2

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 109 of the main course book.

While teaching this chapter, tell the students that by combining coding with science, we can perform multiple operations that human beings cannot do like easily, like complex calculations.

Tell the students about temperature and clinical thermometer.

Demonstrate the AI Connect programs to know the room temperature to the students.

Explain the topic of pH value to the students with the help of an AI Connect program.

Introduce the topic of force and laws of motion to the students to the students.

Demonstrate the AI Connect program to the students to explain the relationship between of force, mass and acceleration.

Ask the student to solve the exercise Quest given on page 114 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. Define temperature/clinical thermometer.

Q. What is the meaning of elif keyword in Python?

Q. What is pH value?

Q. What is the SI unit of force?

Q. Who developed three laws of motion?

Evaluation

After explaining the chapter, let the students do the exercises given on pages 117 and 118 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 118 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based question on page 119 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 119 of the main course book will enhance the ability of the students and serve as critical thinking and interdisciplinary learning activities.

Suggested Activity

Ask the students to create a program in AI Connect to find the mass of a car if its moving with the acceleration of 3m/s and force is 6000N.

10 AI in Real World

Teaching Objectives

Students will learn about

- Applications of AI
- Eye Detection in AI Connect

Number of Periods	
Theory	Practical
1	2

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 121 of the main course book.

While teaching this chapter, tell the students that Artificial Intelligence (AI) is becoming very important part of our lives.

Tell the students some uses of AI that we use in our daily lives.

Demonstrate the AI Connect programs in which AI coding is used to detect the person's eyes.

Ask the student to solve the exercise Quest given on page 126 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. What type of biometrics are used in aadhaar card?

Q. Facial Features sub-category is present under which block category in AI Connect?

Q. Get Face Count block is present under which category of blocks in AI Connect?

Evaluation

After explaining the chapter, let the students do the exercises given on pages 126 and 127 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on page 127 of the main course book. Ask the students to answer the questions given as Competency-based/Application-based question on page 127 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 127 of the main course book will enhance the ability of the students and serve as critical thinking activity.

Suggested Activity

Ask the students to create a program in AI Connect to detect whether a person's eyes are visible or not.

11 Textual Coding

Teaching Objectives

Students will learn about

- Basics of Textual Coding
- Switch to Textual Coding
- Addition Using Textual Coding
- Arithmetic Operators in Textual Coding

Number of Periods	
Theory	Practical
2	3

Teaching Plan

Before starting the chapter, ask the students to solve the question in Let's Recap given on page 128 of the main course book.

While teaching this chapter, tell the students that text-based coding involves writing lines of code.

Tell the students about print command and its textual code in AI Connect.

Demonstrate the way to create a variable and to assign a value to using textual code in AI Connect.

Show the use in input commands using textual code in AI Connect.

Tell the students block bases and textual code for data types in AI Connect.

Explain the use of arithmetic operations in AI Connect.

Demonstrate the steps involved to switch to textual code in AI Connect.

Show the use of textual code by creating different programs in AI Connect.

Ask the student to solve the exercise Quest given on page 135 of the main course book.

Extension

Ask the students some oral questions based on this chapter.

Q. Differentiate between block based coding and textual coding.

Q. What is the use of print() function?

Q. Tell the textual code for asking the user to enter any number.

Q. What is the textual code for integer data type?

Q. What is the use of arithmetic operations in Python?

Q. How can you switch to textual code in AI Connect?

Evaluation

After explaining the chapter, let the students do the exercises given on pages 135 and 136 of the main course book as Exercise. Tell the students to solve Fun Zone activity given on pages 136 and 137 of the main course book. Ask the students to answer the questions given as Competency-based/ Application-based question on page 137 of the main course book. Help the students to solve these questions.

In creative assignment, activity like Lab Activity given on page 137 of the main course book will enhance the ability of the students and serve as critical thinking and interdisciplinary learning activities.

Suggested Activity

Ask the students to create a program using textual code in AI Connect to find the square of a number entered by the user.