



## ICSE 2025 EXAMINATION

### SPECIMEN QUESTION PAPER

# ROBOTICS AND ARTIFICIAL INTELLIGENCE

*Maximum Marks: 100*

*Time allowed: Two hours*

*Answers to this Paper must be written on the paper provided separately.*

*You will **not** be allowed to write during the first 15 minutes.*

*This time is to be spent in reading the question paper.*

*The time given at the head of this Paper is the time allowed for writing the answers.*

*Attempt all questions from Section A and any four questions from Section B.*

*The intended marks for questions or parts of questions are given in brackets[ ].*

#### *Instruction for the Supervising Examiner*

*Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.*

## SECTION A

(Attempt all questions.)

### Question 1

[20]

Choose the correct answers to the questions from the given options.

(Do not copy the question, write the correct answers only.)

- (i) Select the field in which the following robots are used.



- (a) Agriculture
  - (b) Warehouse
  - (c) Electric Car
  - (d) Entertainment
- (ii) Which of the following is an example of probabilistic computing?
- (a) Time tables
  - (b) Maps
  - (c) Report cards
  - (d) Weather forecast
- (iii) Which of the following statements about cobots is true?
- (a) Cobots eliminate the need for human presence
  - (b) Cobots work collaboratively with humans
  - (c) Cobots are used only in educational settings
  - (d) Cobots are outdated technology
- (iv) Tinkercad can be used to design and simulate the motion of a simple robotic system, such as a wheeled mobile robot.
- (a) True
  - (b) False

(v) Consider the following block diagram of a control system in a robot:

$$[\text{Input}] \rightarrow [\text{Controller}] \rightarrow [\text{Robot}] \rightarrow [\text{Feedback}]$$

Which component of this system is responsible for making decisions based on sensor data?

- (a) Input
- (b) Robot
- (c) Controller
- (d) Feedback

(vi) What is the function of actuators in a robotic system?

- (a) To process data from sensors
- (b) To control the power supply to the robot
- (c) To convert electrical signals into physical movement
- (d) To regulate the temperature within the robot

(vii) Which of the following character is used to give a single line comment in Python?

- (a) //
- (b) #
- (c) !
- (d) /\*

(viii) Camera is an example of

- (a) Pressure Sensor
- (b) Vision Sensor
- (c) Solar Sensor
- (d) Motion Sensor

(ix) Which of the following expression is the correct option for ab?

- (a) a\*b
- (b) a\*\*b
- (c) a^b
- (d) a^\*b

- (x) Which statement about single-board computers in robotics is correct?
- (a) Single-board computers are only used for power supply in robotic systems.
  - (b) Single-board computers cannot process sensor data.
  - (c) Single-board computers are used to control the operations of a robotic system.
  - (d) Single-board computers are not suitable for use in wheeled mobile robots.
- (xi) In the context of machine learning, what is the role of data?
- (a) To execute pre-defined instructions.
  - (b) To provide examples for machine learning and predictions.
  - (c) To store the robot's programming code.
  - (d) To manage and direct the robot's movements.
- (xii) The motor in a robot works as a/an:
- (a) Actuator
  - (b) Sensor
  - (c) End effector
  - (d) Controller
- (xiii) Which statement best describes the Turing Test?
- (a) It measures the speed of a computer.
  - (b) It evaluates a machine's intelligence.
  - (c) It tests human memory capacity.
  - (d) It determines a person's IQ score.
- (xiv) What is the primary goal of cybersecurity?
- (a) To increase computer speed
  - (b) To protect data from unauthorised access
  - (c) To reduce software development time
  - (d) To enhance user interface design

(xv) **Assertion (A):** The Turing Test helps in evaluating the intelligence of a machine.

**Reason (R):** The Turing Test checks if a machine can exhibit human-like behavior.

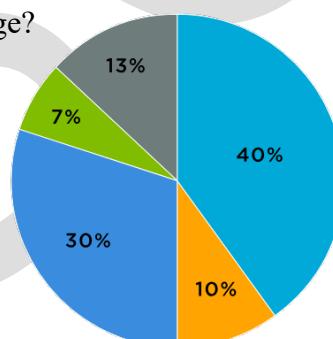
- (a) Both A and R are true, and R is the correct explanation of A
- (b) Both A and R are true, but R is not the correct explanation of A
- (c) A is true, but R is false
- (d) A is false, but R is true

(xvi) What are the 4 Ws used for understanding a problem in AI project scoping?

- (a) Who, What, When, Where
- (b) Why, When, Where, What
- (c) Who, What, Where, Why
- (d) Who, Where, When, Why

(xvii) What type of graph is shown in the image?

- (a) Line graph
- (b) Bar graph
- (c) Pie chart
- (d) Scatter plot



(xviii) What does the following code output?

```
string = "Hello World"  
print(string[1:5])
```

- (a) "Hell"
- (b) "ello"
- (c) "World"
- (d) "Hello"

- (xix) The full form of IDLE is:
- (a) Integrated Development and Language Environment.
  - (b) Integrated Development and Learning Environment.
  - (c) Inline Development and Learning Environment.
  - (d) Inside Development and Language Environment
- (xx) Which operation can be performed on both lists and tuples?
- (a) Append elements
  - (b) Insert elements
  - (c) Access elements
  - (d) Delete elements

## Question 2

Answer the following questions:

- (i) What are some features of smart home robotic systems? [2]
- (ii) *Cobots are becoming increasingly important in industries where human-robot collaboration can enhance productivity and safety. For example, in manufacturing, cobots can perform repetitive tasks while humans handle more complex and decision-making tasks, leading to more efficient workflows.*  
With reference to the above, mention two benefits of using cobots in manufacturing. [2]
- (iii) Explain the role of gears in robotic systems. [2]
- (iv) Differentiate between Data and Information. [2]
- (v) Outline the steps involved in machine learning. [2]
- (vi) What is the Turing Test, and what role does it play in AI? [2]
- (vii) What is problem scoping in the context of an AI project? [2]

- (viii) What will be the output of the code given below: [2]  
my\_list = [10, 20, 30, 40, 50];  
print("The number is ", my\_list[-2])
- (ix) What will be the output of the code given below: [2]  
import numpy as np  
arr = np.array([1, 2, 3, 4, 5]);  
print(arr[2]);
- (x) What will be the output of the code given below [2]  
text = "Python Programming";  
print(text[7:]);

## SECTION B

*(Answer **any four** questions from this Section.)*

*The answers in this section should consist of the programs in either python environment or any program environment with python as the base.*

*Each program should be written using variable description / mnemonic codes so that the logic of the program is clearly depicted.*

*Flowcharts and algorithms are not required.*

### Question 3

- (i) How do assistant robots in healthcare improve patient care? [3]  
Provide two specific examples.
- (ii) What are the main differences between subjective decision making by humans and objective decision making by machines? [3]
- (iii) Write a Python program to plot a bar chart using the Matplotlib library. Your program should: [9]  
1. Import the necessary libraries.  
2. Create a list of categories and their corresponding values.  
3. Plot a bar chart with appropriate labels and a title.

#### **Question 4**

- (i) Explain the key differences between traditional industrial robots and cobots. [3]

Why are cobots considered more suitable for collaborative tasks?

- (ii) Describe the steps involved in a machine learning project using the example of fruit sorting. [3]

- (iii) Create a user defined function isPrime ( ) to accept a number and returns True if number is prime otherwise False. (A number is said to be prime if it is only divisible by itself and 1) [9]

#### **Question 5**

- (i) Define the role of sensors in robotics. [3]

Differentiate between internal and external sensors with examples.

- (ii) List three ethical issues related to cybersecurity. [3]

- (iii) A library charges fine according to the number of days a book returned late, according to the following criteria. [9]

Days	Fine per day
First 10 days	Rs. 1
Next 10 days	Rs. 2.5
Beyond 20 days	Rs. 5

Write a program to enter the number of days a book was returned late and print the fine to be paid.

#### **Question 6**

- (i) Explain the use of Tinkercad in designing robotic components. [3]

What are the advantages of visualising motion using Tinkercad?

- (ii) Explain how the phenomenon of hacking can lead to data theft and what measures can be implemented to prevent it. [3]

- (iii) Write a Python program that performs the following operations on a list of integers: [9]
1. Create a list of integers: [10, 20, 30, 40, 50].
  2. Append the integer 60 to the list.
  3. Insert the integer 25 at index 2.
  4. Sort the list in ascending order.
  5. Search for the integer 30 in the list and print its index.
  6. Print the final list.

### Question 7

- (i) Explain the importance of integrating sensors, actuators, and controllers in a robotic system. [3]
- (ii) Explain the importance of defining the problem statement in an AI project. How does it impact the project's success? [3]
- (iii) Write a Python program that performs the following operations on a tuple: [9]
1. Create a tuple with the elements: (5, 10, 15, 20, 25).
  2. Access and print the element at index 2.
  3. Convert the tuple into a list.
  4. Append the integer 30 to the list.
  5. Convert the list back into a tuple.
  6. Print the final tuple.

### Question 8

- (i) Describe the process of building a simple wheeled mobile robot and mention the key components involved. [3]

- (ii) List and briefly describe three different ways of representing data visually. [3]
- (iii) Write a Python program that performs the following operations on a string: [9]
1. Create a string with the value "Artificial Intelligence".
  2. Convert the entire string to uppercase and print the result.
  3. Find and print the position of the substring "Intelligence" within the string.
  4. Replace the substring "Artificial" with "Machine" and print the new string.
  5. Check if the string starts with "Machine" and print the result (True/False).
  6. Count and print the number of occurrences of the letter 'i' in the string.