DELHI PUBLIC SCHOOL NEWTOWN
SESSION 2023-24
FINAL EXAMINATION

CLASS: IX **FULL MARKS:100**
SUBJECT: ROBOTICS & AI [SET A] **TIME: 2 HOURS**

Instructions:
This paper consists of 4 printed pages. This paper is divided into two sections.
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[].

Section A
(Attempt all questions.)

Question 1 **[1x10=10]**

a) Information can be defined as ____
   i) Raw facts
   ii) Abrupt sentence
   iii) Processed data
   iv) Collection of data

b) The three laws of robotics are created by:
   i) Stephen Hawking
   ii) Victor Scheinman
   iii) Elon Asima
   iv) Isaac Asimov

c) What is the advantage of using a robot in hazardous environment?
   i) They are able to operate continuously without any human intervention.
   ii) They are less expensive
   iii) They provide greater precision and control over a task
   iv) They minimise the risk of human exposure to hazardous material

d) The _____ are the tools that are attached to the end of the manipulator.
   i) End-effectors
   ii) Grippers
   iii) Manipulators
   iv) Joints

e) An aerial robot should contain _____
   i) Light weight payload
   ii) Heavy Payload
   iii) A payload that does not affect its flying
   iv) No payload at all

f) Which type of joint permits rotation in multiple axes?
   i) Revolute joint
   ii) Spherical joint
   iii) Prismatic joint
   iv) Rotating joint

g) **Assertion:** Machine learning requires good quality and sufficient data to train and test the algorithm

   Reason: For correct classification, good quality data that is free from noise, and sufficient data is required for training and testing of algorithm.

i) Assertion **(A)** and Reason**(R)** both are true and **(R)** is the correct explanation of **(A)**
ii) Assertion **(A)** and Reason**(R)** both are true but **(R)** is not the correct explanation of **(A)**
iii) Assertion is true and Reason is false
iv) Assertion is false and Reason is true

h) What would be the output of the following code snippet?

```
def fun(x, y=2):
    return x * y
result = fun(5)
print(result)
```

i) 5 ii) 10
iii) 2 iv) error

i) Consider the following statement and answer the following question:
Data=("name":"Subhash", "age": 15)

This statement will create a-
i) Tuple ii) Set
iii) List iv) Dictionary

j) **Assertion (A):** Python standard library consists of number of modules
Reasoning (R) : A function in a module is used to simplify the code and avoid repetitions

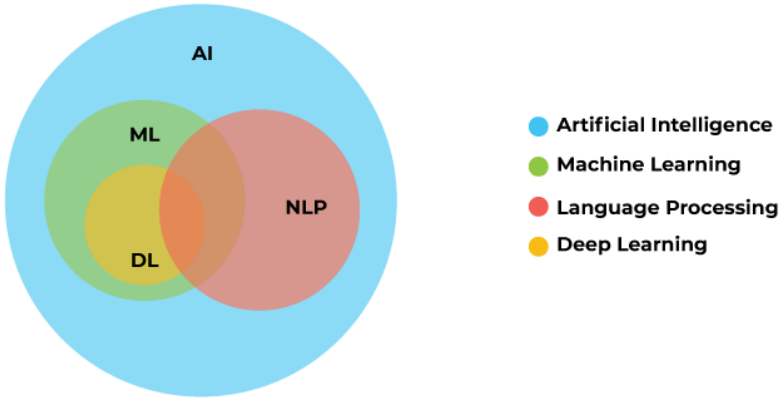
i) Assertion **(A)** and Reason**(R)** both are true and **(R)** is the correct explanation of **(A)**
ii) Assertion **(A)** and Reason**(R)** both are true but **(R)** is not the correct explanation of **(A)**
iii) Assertion is true and Reason is false
iv) Assertion is false and Reason is true

Question 2

a) Correct the following python code that reverses a number. Rewrite the code and underline the corrections. [2x4=8]

```
define revNumber(num):
    rev = 0
    rem = 0
    While num > 0:
        rem = num %10
        rev = rev*10 + rem
        num = num /10
        return rev
print(revNumber(1234))
```

b) Study the following image and answer the questions-



i) State the relationship between **AI** and **ML**. [2]

ii) What is the role of **NLP**? [2]

c) Identify the type of data in the given table [4]

Scenario	**Type of Data**
A movie clip	
Radio news	
Newspaper content	
Recording of telephonic conversation	

d) What is the purpose of **Turing** test with the help of an example. [2+2]

Section – B

(Attempt any four questions from this section. Write VDT for all python programs.)

Question 3

a) A neon number is **a number where the sum of digits of square of the number is equal to the number**.
Example- **9^2 = 81 = 8+1=9**
Write a program in **Python** to read a number and check if it is a **Neon** number. [14.5]

b) What are sensors? Discuss three types of sensors in brief. [3]

Question 4

a) A number is called an Automorphic number **if and only if its square ends in the same digits as the number itself**.
Examples-
5^2 = 2**5**
6^2 = 3**6**
76^2 = 57**76**
376^2 = 141**376**
Input a number from the user and write a program in **Python** to check if the number is an **Automorphic** number or not. [14.5]

b) Differentiate data with information. Give example. [3]

Question 5

a) Write a program in **Python** to read a number and a digit. Check if the digit **exist** in the number or not. If exists, print its **frequency.** [14.5]

Example 1. – N1 = 6426272 N2=2
Output- 2 exist in 6426272 3 times
Example 2. – N1 = 4275 N2=9
Output- 9 does not exist

b) Discuss the three ***basic*** gates, draw their truth table and symbol. [3]

Question 6

a) ABC Diagnostic Centre announces discount on its health check-up plan as below: [14.5]

Plan Range	**Senior Citizen (G)**	**General Citizen (C)**
<1200	10%	5%
1201 – 2000	20%	10%
>2000	30%	15%

Write a program in **Python** to read the cost of the health package, name of the patient, patient type (G/C) and calculate the discount. The program should print the **patient name, patient type, package cost, discount price and amount payable.**

b) What is ***derived*** gate? Give an example with its symbol and Boolean expression. [3]

Question 7

a) i) Write a function in **Python** that return the sum of multiples of **3** and **5** between **0** and ***limit.*** The limit should be read as a parameter. Example, if the limit is 20 then it should return the **sum** of 3,5,6,9,10,12,15,18,20. [8]

ii) Print the ***multiplication table*** of a number entered by the user. [6.5]

b) Name three rules of naming a variable in **Python**. [3]

Question 8

a) Implement the following methods in **Python**- [14.5]

a. #def prime(n) - checks if **n** is a prime number or not**. Example** if n=3 it displays **"Prime**", if n=4 it displays "**Non Prime**"
b. #def sumOfOdds(n) - returns the sum of odd digits present in **n**. Example if **n=3281** the it will return **3+1=4**

b) Briefly discuss three applications of **AI** in the field of **medicine/ healthcare**. [3]