Information Booklet cum Syllabus

Of

Artificial Intelligence using Python

Revision-I

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National Institute of Electronics and Information Technology

An Autonomous Scientific Society under

Ministry of Electronics and Information Technology, Government of India

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CONTENTS

1. About Course

Artificial intelligence is broad and fast growing sub-field of computer science concerned with the intelligence demonstrated by machines, in contrast to the intelligence displayed by humans. This course covers all the foundation skills necessary to start the Artificial Intelligence and its implementation in Python.

2. NIELIT

National Institute of Electronics and Information Technology, NIELIT, (Erstwhile DOEACC Society) is an autonomous scientific society of the Ministry of Electronics & Information Technology, Government of India. The Society is registered under the Societies Registration Act, 1860. NIELIT was set up to carry out Human Resource Development and related activities in the area of Information, Electronics & Communications Technology (IECT). NIELIT is engaged both in Formal & Non-Formal Education in the areas of IECT besides development of industry oriented quality education and training programmes in the state-of-the-art areas. NIELIT has endeavored to establish standards to be the country's premier institution for Examination and Certification in the field of IECT. It is also one of the National Examination Body, which accredits institutes/organizations for conducting courses in IT and Electronics in the non-formal sector.

3. Objective of Course

Artificial intelligence is broad and fast growing sub-field of computer science concerned with the intelligence demonstrated by machines, in contrast to the intelligence displayed by humans. This course covers all the foundation skills necessary to start the Artificial Intelligence and its implementation in Python. Python is a open-source language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment. It is widely used in many scientific areas for data exploration and prediction, Expert System, Neural network, Speech recognition and Natural language processing.

After completing the module, the learner will be able to:

- Understand the basic concepts of Python language.
- Understand the development of GUI based application
- Understand Database Connectivity with python application
- Understand the basics of Machine Learning & their types.
- Understand various learning models, methods and applications under supervised and unsupervised learning.
- Understand data preprocessing for Machine Learning.
- Solve real world problems through machine learning implementation leading to predictions.

4. Job Roles of Course

After successful completion of the qualification the candidates shall be employed in the industries for following occupations:

- Python Developer

- Machine Learning Developer

5. Eligibility

12th with knowledge of Programming Language

6. Total duration of the Course

80 Hours (Theory: 28Hrs, Practical/Tutorial: 52Hrs)

7. Course Details

7.1.Course Outline and Objective of Each Unit

S. No.	Unit Name	Duration (Theory) in Hours	Duration (Practical) in Hours	Total Learning Hrs.	Learning Objectives
1	Module 1 - Introduction of Artificial Intelligence (AI) -	2	0	2	After completion of this module, the candidate will be able to : • Understand the concept of AI and use of Python in AI
2	Module 2 - Python Programming	12	24	36	After completion of this unit of module, Learner will be able to • Understand features of Python that make it one the most popular languages in the industry. • Use the basic operators and expressions available in Python in developing program. • Understand and use various Python statements like conditional constructs, looping constructs in writing Python program. • Work with various built-in Sequence datatypes and their use. • Work with modular approach using user defined functions. • OOP's Concept and implementation.

					• Connectivity of database with python programs. • GUI programming using Tkinter
3	Module3 - Artificial Intelligence and Machine learning.	12	24	36	After completion of this module the participants will be able to • Data Manipulation using Numpy and Pandas. • Data Visualization using Matplotlib. • Data Preprocessing for Machine Learning. • Tasks performed by Machine Learning Algorithms – Classification, Regression. • Various machine learning algorithms and their implementation
4	Module 4 - Mini Project	0	06	06	After completion of the project students will be • Able to apply machine learning algorithm on given data. • Able to develop mini project GUI and database.

7.2.Detailed Syllabus

Unit Name	**Contents**	**Hrs.**
Module 1 - Introduction of Artificial Intelligence (AI) -	• What is Artificial Intelligence • Basics concept of Artificial Intelligence • Necessity of Learning AI • Application of AI • Examples of AI • Why Python for AI	02
Module 2 - Python Programming	• Introduction to Python • Conditional Statements • Lists • Tuple	36

	• Dictionaries • Functions • OOPs Concept • Modules • Exception Handling • Input-Output • Database Connectivity • Introduction to GUI programming	
Module3 - Artificial Intelligence and Machine learning	• Introduction and Installation of NumPy, Panda and Matplotlib and setting Environment. • Data Manipulation using Numpy & Panda • Data Visualization using Matplotlib • Machine Learning • Supervised Learning • Unsupervised Learning • Application of Artificial Intelligence	36
Module 4 - Mini Project	• Mini Project on Home Loan prediction	06

8. Reference Books/Study Material

1. Python Programming- A modular Approach (with Graphics, database, Mobile and Web Applications by Sheetal Taneja and Naveen Kumar, Pearson.
2. Beginning Programming with Python Dummies by John Paul Meuller.
3. Machine Learning an algorithmic Perspective by Stephen Marshland
4. Introduction to Machine Learning with python by Andreas C Muller, Sarah Guido.

9. Practical Assignments

Assignment 1. Create a numpy array with following columns: hindi, English, science, math and commerce with data type int32.

i. Insert at least 10 rows in the above array.
ii. Display size and shape of the array.
iii. Print sum of each column.
iv. Print maximum element from each column.
v. Print sum of 1,4,5 row.

Assignment 2.

1. Create two array of size (3, 3) and print their sum and multiplication.
2. Create an array of size 10 and calculate square root and standard deviation.
3. Print size and dimension of above arrays.

Assignment 3.

1. Write a Python program to create and display a series of data using Pandas module.
2. Create a pandas series of 10 elements and specify their index as 101 to 110.
3. Print bottom 5 elements of the series created in question 2.
4. Insert 3 new elements in above series on index 111, 112 and 113.
5. Delete the elements at index- 103, 104,107,111 in above list.

Assignment 4.

Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels. Sample Python dictionary data and list labels:

1. exam_data = {'name': ['Ankita', 'Dia', 'Kapil', 'Jayesh', 'Esha', 'Mayank', Ravi, 'Lata', 'Kamal', 'Jatin'],
2. 'score': [12.5, 9, 16.5, 15, 9, 20, 14.5, 17.5, 8, 19],
3. 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
4. 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']}

Assignment 5.

Create a data frame using dictionary.

1. Dictionary (‘id’:[P101,P102,P103,P104,P105], ‘Price’:[256, 340, 540, 260, 470])
2. Print the price of product id – p102.
3. Print values of Price column.
4. Rename the column id to Product_Id and Price to Base_Price.

Assignment 6.

Create a new data frame with three columns – Product_Name, Cost, Sales.

1. Add 10 values in data frame.
2. Add a new column named quantity with 10 values.
3. Add a new column named: Profit and total_profit and fill values.
4. Insert a new column named location after Product_Name column with 10 cities.

(New Delhi, Lucknow, Kolkata, Lucknow, New Delhi, Bengaluru, Chennai, Chennai, Kolkata, Bengaluru)

Assignment 7.

Solve sample Machine Learning Regression problem.

Assignment 8.

Solve sample Machine Learning classification problem.

10. Sample Questions

Q1 Who is known as Father of Artificial Intelligence ?

a) Alan Turing
b) Charls Babbage
c) John Mccarthy
d) None of the Above

Q2 Which of the following is the common language for Artificial Intelligence?

a) Python
b) Java
c) Lisp
d) PHP

Q3 What is Artificial intelligence?

a) Putting your intelligence into Computer
b) Programming with your own intelligence
c) Making a Machine intelligent
d) Playing a Game

Q4 Which of the following is the advantage of AI?

a) Faster decision
b) 24/7 Support
c) Reduce the Risk
d) All of the above

Q5 Which of the following is the branch of Artificial Intelligence?

a) Machine Learning
b) Cyber forensics
c) Full-Stack Developer
d) Network Design

Q6 Identify the type of learning in which labeled training data is used.

a) Reinforcement learning
b) Supervised Learning
c) Unsupervised Learning
d) None of the above

Q7 What is the term known as on which the machine learning algorithms build a model based on sample data?

a) Data Training
b) Training Data
c) Transfer Data
d) None of the above

Q8 Which one of the following statement is true for machine learning?

a) In Machine learning Input data along with the output is fed into the machine.
b) We would feed input data along with well written and tested program into machine to generate output
c) In traditional programming input data along with the output is fed into the machine.
d) None of the above

Q9 In _____ we do prediction in the format of number or continuous value

a) Classification
b) Regression
c) Cluster
d) Association

Q10 Among the following option identify the one which is not a type of learning

a) Semi Unsupervised Learning
b) Supervised Learning
c) Unsupervised learning
d) None of the above