**Annexure 1**

**Detailed Syllabus of Course**

| S. No | Module Title | Topics | Duration (Hours) | | Learning Outcome |
|---|---|---|---|---|---|
| | | | **Theory** | **Lab** | |
| 1. | **Primer Concepts** | • Basic Concept of Artificial Intelligence (AI)<br>• The Necessity of Learning AI<br>• What is Intelligence?<br>• What is Intelligence Composed of?<br>• Learning What's Involved in AI<br>• Application of AI<br>• Cognitive Modelling: Simulating Human Thinking Procedure<br>• Agent & Environment. | 1 | 1 | • Understand the concept of AI<br><br>• know famous expert system<br><br>• Understand Learning ways<br><br>• Understand, how a machine behaved like a human |

| 2 | **Getting Started** | <ul><li>Why Python for AI</li><li>Features of Python</li><li>Installing Python</li><li>Setting up PATH</li><li>Running Python</li><li>Script from the Command-line</li><li>Integrated Development Environment.</li></ul> | 2 | 1 | <ul><li>Write programs in python</li><li>Understand, why python is suitable programming language for AI</li></ul> |
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| 3 | Natural language Processing | • Components of NLP Difficulties in NLU<br><br>• NLP Terminology,<br><br>• Steps in NLP | 2 | 3 | • Understand how device make communication with a human in English language |
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| 4 | NLTK Package | o Importing NLTK<br><br>o Downloading NLTK's Data<br><br>o Installing Other Necessary Packages<br><br>o Concept of Tokenization<br><br>o Stemming, and Lemmatization<br><br>o Chunking: Dividing Data into Chunks<br><br>o Types of chunking, Bag of Word (BoW) Model<br><br>o Concept of the Statistics | 2 | 5 | • Using NLTK Pacakge for NLP Applications |

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| | | o Building a Bag of Words Model in NLTK<br><br>o Solving Problems<br><br>o Topic Modelling: Identifying Patterns in Text Data<br><br>o Algorithms for Topic Modelling. | | | |
| 5 | Time Series Data | o Introduction<br><br>o Installing Useful Packages<br><br>o Pandas: Handling, Slicing and Extracting Statistic from Time Series Data<br><br>o Extracting Statistic from Time Series Data<br><br>o Analysing Sequential Data by Hidden Markov Model (HMM)<br><br>o Analysis of Stock Market data. | 2 | 4 | • Understand how to predict future values of the time series.<br><br>• Understand how to extract future data |

| 6 | Speech Recognition | ✓ Building a Speech Recognizer<br><br>✓ Visualizing Audio Signals - Reading from a File and Working on it<br><br>✓ Characterizing the Audio Signal: Transforming to Frequency Domain<br><br>✓ Generating Monotone Audio Signal<br><br>✓ Feature Extraction from Speech<br><br>✓ Recognition of Spoken Words. | 2 | 3 | • Extracting features from speech signals<br>• Identify Speech and using it for application |
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| 7 | Heuristic Search | ✓ Concept of Heuristic Search in AI<br><br>✓ Difference between Uninformed and Informed Search<br><br>✓ Real World Problem Solved by Constraint Satisfaction. | 2 | 3 | • Understand how a machine reach a goal.<br><br>• Understand some AI search algorithms for example A* and AO* |
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| 8 | Gaming | ✓ Search Algorithms<br><br>✓ Combinational Search<br><br>✓ Minimax Algorithm<br><br>✓ Alpha-Beta Pruning<br><br>✓ Negamax Algorithm<br><br>✓ Building Bots to Play Games<br><br>✓ A Bot to Play Last Coin Standing | 2 | 4 | • Understand how a machine play a game.<br><br>• Create a small program like tic tac toe |

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| | | ✓ A Bot to Play Tic Tac Toe. | | | |
| 9 | Reinforcement learning | ✓ Basics of Reinforcement Learning<br><br>✓ Building Blocks: Environment and Agent<br><br>✓ Constructing an Environment with Python<br><br>✓ Constructing a learning agent with Python | 3 | 7 | • Understand how a machine choose best solution of a given problem. |

| 10 | Genetic Algorithms | ✓ What are Genetic Algorithms? How to Use GA for Optimization Problems?<br><br>✓ Installing Necessary Packages<br><br>✓ Implementing Solutions using Genetic Algorithms**.** | 2 | 3 | • Understand how a machine choose optimized solution of a given problem. |
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| 11 | Computer Vision | ✓ Computer Vision<br><br>✓ Computer Vision Vs Image Processing<br><br>✓ Installing Useful Packages, Reading, Writing and Displaying an Image<br><br>✓ Preprocessing and Image analysis<br><br>✓ Colour Space Conversion<br><br>✓ Edge Detection | 4 | 8 | • Understand how a machine identify, process an image of picture<br>• Implementing Application based on image processing |

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| | | ✓ corner detection<br>✓ Face Detection<br>✓ Eye Detection. | | | |
| 12 | **Deep Learning** | ✓ Machine Learning v/s Deep Learning<br>✓ Artificial Neural Network<br>✓ Convolutional Neural Network (CNN)<br>✓ Installing Useful Python Packages<br>✓ Building Linear Regression using ANN<br>✓ Image Classifier: An Application of Deep Learning. | 6 | 18 | • Deep Learning Algorithms<br>• Implementing Deep Learning based applications |
| Total | | | **90 Hours(Theory-30, Lab-60)** | | |