**Module 9 : Natural Language Processing [NLP]**

**1. What do you understand by Natural Language Processing?**

Natural Language Processing (NLP) is a field of artificial intelligence (AI) that focuses on the interaction of computers with human language. Its objectives are to let machines learn, understand, interpret, and generate human language in a manner that is both meaningful and useful. NLP is comprised of numerous tasks, which include:

* Text Analysis: Reading and extracting information from a written text; for instance, key concepts, topics, or sentiment.
* Language Modeling: Developing models to predict sequences of words in probability, often used for speech recognition or text prediction.
* Machine Translation: Automatically translating text or speech from one language into another language.
* Speech Recognition: Converting spoken language into text so that systems can be controlled by voice commands, such as virtual assistants (e.g., Siri or Alexa).
* Named Entity Recognition (NER): Identifying key elements in text and classifying them; people, organization, or locations.
* Part-of-Speech Tagging: Labelling every word in a sentence with the appropriate grammatical tag, such as nouns, verbs, adjectives, etc.  
  Sentiment
* Analysis: Determine whether a given text is positive or negative, sometimes used for social media monitoring, customer feedback, etc.
* Text Generation: Produce coherent new text from input. Applications include summarization, story generation, or developing chatbots.

NLP combines linguistics, computer science, and machine learning to process and analyze large amounts of natural language data. Computers can perform tasks that required human-like understanding by using techniques such as tokenization, syntactic parsing, deep learning, and word embeddings in building NLP systems.

**2. What are the steps involved in solving an NLP problem?**

* Problem Definition
* Data Collection
* Data Preprocessing
* Feature Engineering
* Model Selection
* Training the Model
* Evaluation
* Model Optimization
* Model Deployment
* Post-Processing and Interpretation

3. What is an ensemble method in NLP? With Example.

An ensemble method in machine learning (and NLP) is combining the predictions of multiple models to improve the overall performance and robustness of the system. The idea is that a group of models can often perform better than any individual model by reducing the risk of errors or biases specific to any one model.  
  
In NLP, ensemble methods combine results produced by different algorithms, architectures, or models to leverage the strengths of each toward achieving better generalization and accuracy.