1. What you understand by Text Processing? Write a code to perform text processing?

   Text processing involves manipulating or analyzing text data to make it suitable for a specific task. This can include tasks like normalization (e.g., lowercasing), tokenization, removing stopwords, and stemming. Here's a simple Python code snippet for basic text processing:

```
import nltk
from nltk.corpus import stopwords
from nltk.stem import PorterStemmer
from nltk.tokenize import word_tokenize

nltk.download('punkt')
nltk.download('stopwords')

text = "Hellp! My name is Dhayanithi. How are you?."
stop_words = set(stopwords.words('english'))

words = word_tokenize(text)
filtered_text = [word for word in words if word.casefold() not in stop_words]
stemmed_text = [PorterStemmer().stem(word) for word in filtered_text]

print(stemmed_text)
```

   2. What you understand by NLP toolkit and spacy library? Write a code in which any one gets used.

   NLP toolkits like NLTK (Natural Language Toolkit) and the SpaCy library provide pre-built functions for various natural language processing tasks, such as tokenization, part-of-speech tagging, named entity recognition, and more. SpaCy is known for its efficiency and ease of use for complex NLP tasks. Here's an example code using SpaCy:

```
import spacy
```

```
nlp = spacy.load("en_core_web_sm")
doc = nlp("Apple is looking at buying U.K. startup for $1 billion")

for ent in doc.ents:
    print(ent.text, ent.label_)
```

3.Describe Neural Networks and Deep Learning in Depth?

Neural networks are computational models inspired by the human brain's structure and function, used to recognize patterns and solve complex problems. They consist of layers of interconnected nodes or neurons, where each connection can transmit a signal from one node to another. Deep learning is a subset of machine learning that utilizes deep neural networks, which are neural networks with many layers. These networks can learn hierarchical representations of data, making them particularly effective for tasks such as image and speech recognition, natural language processing, and more. Deep learning models automatically learn feature representations from raw data, eliminating the need for manual feature extraction.

4. what you understand by Hyperparameter Tuning?

Hyperparameter tuning involves finding the optimal set of hyperparameters for a learning algorithm. Hyperparameters are the configuration settings used to structure the learning process (e.g., learning rate, number of hidden layers, number of neurons in each layer). Unlike model parameters, hyperparameters are not learned from the data but are set prior to the training process. Tuning can be performed using various methods, including grid search, random search, and Bayesian optimization.

5. What you understand by Ensemble Learning?

Ensemble learning is a machine learning technique that combines several base models in order to produce one optimal predictive model. By leveraging the strengths and

compensating for the weaknesses of each base model, ensemble methods can achieve higher accuracy than any single model could on its own. Common ensemble methods include Bagging (e.g., Random Forests), Boosting (e.g., AdaBoost, Gradient Boosting), and Stacking.

6. What do you understand by Model Evaluation and Selection ?

Model evaluation involves assessing the performance of a machine learning model on a given dataset, typically using metrics like accuracy, precision, recall, F1-score for classification tasks, and MSE (Mean Squared Error), RMSE (Root Mean Squared Error) for regression tasks. Model selection is the process of choosing the most suitable model among different models based on their performance metrics. Techniques like cross-validation are used to estimate how well a model will generalize to an independent dataset.

7. What you understand by Feature Engineering and Feature selection? What is the difference between them?

Feature Engineering is the process of using domain knowledge to extract new features from raw data that make machine learning algorithms work more effectively. It involves creating new input features from your existing ones to improve model performance.

Feature Selection involves selecting the most useful features to train on among existing features. It aims to reduce the number of input variables to those that are most predictive of the given outcome.

The difference between them is that feature engineering is about creating new features to improve model performance, while feature selection is about choosing the best subset of existing features. Feature engineering adds complexity by introducing new data, whereas feature selection simplifies models by removing unnecessary variables.