**Experiment No. 03**

**Aim**: Implement Artificial Neural Network (ANN) for Binary Classification using Keras Library

**Objectives**:

1. Understand the concept of Artificial Neural Network.
2. Learn to preprocess and prepare data for ANN analysis.
3. Implement ANN using the Keras library for binary classification.
4. Evaluate the performance of the ANN model.
5. Gain practical experience in predicting binary outcomes using the trained model.

**Theory**:

**Artificial Neural Network (ANN):**

Artificial Neural Network is a machine learning algorithm used for various tasks, including binary classification. It is inspired by the structure and functioning of the human brain.

**Preprocessing Data:**

Similar to logistic regression, data preprocessing for ANN includes handling missing values, scaling, and splitting into training and testing sets. Proper data preprocessing is essential for the success of the model.

**Implementing ANN:**

Keras is a popular high-level neural networks API, written in Python and capable of running on top of TensorFlow, CNTK, or Theano. It simplifies the process of building, training, and evaluating neural networks.

**Model Architecture:**

The architecture of an ANN involves designing the structure of layers, selecting activation functions, and defining the number of nodes in each layer. Keras provides a user-friendly interface for building and customizing neural network architectures.

**Model Evaluation:**

Evaluation metrics such as accuracy, precision, recall, and F1-score are used to assess the performance of the ANN model. Understanding these metrics helps in making informed decisions about the model's effectiveness.

**Implementation Steps:**

1. Import necessary libraries (NumPy, pandas, and Keras).
2. Load and preprocess the dataset.
3. Build the neural network model using Keras.
4. Compile the model with appropriate loss function and optimizer.
5. Train the model on the training data.
6. Evaluate the model on the testing data.
7. Analyze the performance metrics and adjust the model if necessary.

**Conclusion**:

Implementing Artificial Neural Network using the Keras library is a powerful approach for solving binary classification problems. Through this experiment, you will gain practical insights into designing, training, and evaluating neural network models. The knowledge acquired can be applied to various real-world scenarios, contributing to a deeper understanding of machine learning techniques.