**Experiment No. 06**

**Aim**: To design and implement an autoencoder model for image denoising.

**Objectives**:

1. Understand the concept of autoencoder models.
2. Learn to preprocess and prepare noisy images for denoising.
3. Design and implement an autoencoder architecture for image denoising.
4. Train the autoencoder model using appropriate datasets.
5. Evaluate the performance of the trained autoencoder for image denoising tasks.
6. Gain practical experience in image denoising using autoencoder models.

**Theory**:

**Autoencoder Model:**

An autoencoder is a type of artificial neural network used for unsupervised learning. It consists of an encoder network that compresses the input data into a latent space representation and a decoder network that reconstructs the original input from the compressed representation. Autoencoders are often used for tasks like dimensionality reduction, feature learning, and image denoising.

**Image Denoising:**

Image denoising is the process of removing noise from images to improve their visual quality and enhance the interpretability of the underlying information. Autoencoder models can be trained to reconstruct clean images from noisy input images, effectively removing the noise in the process.

**Implementation:**

1. Load and preprocess the dataset of noisy images.
2. Design the architecture of the autoencoder model for image denoising.
3. Train the autoencoder model using the noisy images as input and clean images as targets.
4. Evaluate the performance of the trained autoencoder model on test data.
5. Use the trained autoencoder model to denoise new images.

**Conclusion**:

The implementation of an autoencoder model for image denoising is an effective technique for removing noise from images and improving their quality. By training the autoencoder on noisy-cleanup image pairs, the model can learn to reconstruct clean images from noisy inputs, making it a valuable tool for various image processing tasks.