DL lab 6 – Graph Neural Networks

**Question 02**

1. Explain the differences between supervised learning, self-supervised learning and semi-supervised learning methods

* Supervised learning - In supervised learning, the model is trained on a labeled dataset where each data point has a corresponding label or target. The model learns to map inputs to the correct outputs based on this labeled data.
* Self-supervised learning - Self-supervised learning is a variant of unsupervised learning where the model generates its own labels from the data. The model solves a pretext task without requiring manual labeling.
* Semi-supervised learning - Semi-supervised learning uses a small amount of labeled data along with a large amount of unlabeled data. The model learns from both to improve performance, combining the advantages of supervised and unsupervised learning.

2. Explain the differences between transductive learning and inductive learning.

* Transductive learning - Transductive learning focuses on making predictions only for the specific data points available during training. The model doesn’t generalize to unseen data but instead aims to classify or predict the labels of a given set of unlabeled instances, often within the training set itself.
* Inductive learning - Inductive learning trains a model to generalize from the data it has seen so that it can predict labels for new, unseen data points. The model creates a hypothesis that can be applied to future instances beyond the training data.

**Question 04**

1. Explain the differences between Message Passing GNN, graph convolution network (GCN), graph attention network (GAT) and Graphs AGE. Write the answers in the word file.

* Message Passing GNN – MP-GNN is a general framework for learning on graph-structured data where node features are updated by aggregating information from neighboring nodes.
* Graph convolution network – GCN is a type of MP-GNN that applies a convolution operation to graph data. It aggregates and normalizes feature information from a node’s neighbors to update the node's features.
* Graph attention network – GAT introduces attention mechanisms to GNNs. Instead of treating all neighbors equally, GAT learns attention coefficients to weigh the importance of each neighbor during feature aggregation.
* Graph AGE - GraphSAGE is a scalable GNN model designed to handle large graphs. Instead of using all neighbors, it samples a fixed-size set of neighbors for aggregation, making it efficient for large-scale graphs. It can also generate embeddings for previously unseen nodes.