DS5007 : Deep Learning
Test II (25 March, 2025)

Marks : 15

08:00-08:50 am

Instructions

1. Write your answers neatly in Blue/ Black ink. Do not use pencil / Red ink. If your answer is not legible, you will not get any marks for that.

2. Doubts and questions will not be answered during the exam. If you have to make any assumption about unspecified things, write the assumption clearly with justification.

3. Answer all parts of a question together. If the parts of a single question are not together, then only the first part will be evaluated. Other parts will not get any marks.

4. No material and electronic gadgets are permitted in the exam hall.

1. (a) (1 point) Explain the concept of message passing in GNNs with equation.

   (b) (2 points) What are the key differences between Graph Convolutional Networks (GCNs) and Graph Attention Networks (GATs)?

2. (4 points) Define the gating mechanism in a LSTM with its mathematical equations and drawing.

3. (4 points) Compute the output of a single attention head using the following matrices:

$$
\begin{aligned}
Query: \quad Q &= [[1, 0]; [0, 1]] \\
Key: \quad K &= [[2, 1]; [1, 2]] \\
Value: \quad V &= [[3, 4]; [5, 6]]
\end{aligned}
$$

(1)

Use scaled dot-product attention with a scaling factor $\sqrt{d_k}$.

4. (2 points) What are difference between BERT and GPT?

5. (2 points) What is denoising autoencoder. How training and inference happened?