Date

DL MOST IMP MODULEWISE

MODULE 1 — FUNDAMENTALS OF NEURAL NETWORKS

🔥 WEIGHTAGE: MEDIUM (1 QUESTION – THEORY-BASED)

💡 MOST REPEATED / EXPECTED

1️⃣ EXPLAIN MULTILAYER PERCEPTRON (MLP) ARCHITECTURE AND WORKING.

2️⃣ WHAT ARE FEEDFORWARD NEURAL NETWORKS?

3️⃣ WHAT IS GRADIENT DESCENT? EXPLAIN WITH EXAMPLE.

4️⃣ EXPLAIN THREE CLASSES OF DEEP LEARNING (SUPERVISED, UNSUPERVISED, REINFORCEMENT).

5️⃣ EXPLAIN REPRESENTATION POWER OF MLP AND FEEDFORWARD NNS.

☑️ MOST LIKELY: MLP + GRADIENT DESCENT COMBO QUESTION.

▧ MODULE 2 — TRAINING, OPTIMIZATION & REGULARIZATION

🔥 WEIGHTAGE: HIGHEST (2 QUESTIONS COMPULSORY IN EVERY PYQ)

💡 MOST REPEATED / EXPECTED

1️⃣ EXPLAIN BACKPROPAGATION ALGORITHM WITH EQUATIONS.

2️⃣ COMPARE OPTIMIZATION ALGORITHMS – MOMENTUM, RMSPROP, ADAM.

3️⃣ EXPLAIN REGULARIZATION TECHNIQUES – DROPOUT, BATCH NORMALIZATION, EARLY STOPPING.

4️⃣ EXPLAIN ACTIVATION FUNCTIONS (SIGMOID, TANH, RELU, SOFTMAX).

5️⃣ WHAT ARE L1 AND L2 REGULARIZATION?

6️⃣ EXPLAIN OVERFITTING AND BIAS-VARIANCE TRADEOFF.

☑ MOST LIKELY:

BACKPROPAGATION (ALWAYS THERE)

REGULARIZATION (DROPOUT/BATCHNORM/WEIGHT DECAY)

OPTIMIZERS COMPARISON

▨ MODULE 3 — AUTOENCODERS (UNSUPERVISED LEARNING)

WEIGHTAGE: MODERATE (1 QUESTION EVERY 2 PAPERS)

MOST REPEATED / EXPECTED

1 EXPLAIN AUTOENCODER ARCHITECTURE (ENCODER–DECODER).

2 EXPLAIN UNDERCOMPLETE AND OVERCOMPLETE AUTOENCODERS.

3 EXPLAIN DENOISING AUTOENCODER WITH WORKING.

4️⃣ WHAT ARE APPLICATIONS OF AUTOENCODERS?

5️⃣ EXPLAIN REGULARIZATION IN AUTOENCODERS.

☑️ MOST LIKELY: AUTOENCODER ARCHITECTURE OR TYPES (UNDERCOMPLETE, DENOISING).

▨ MODULE 4 — CNN (SUPERVISED LEARNING)

🔥 WEIGHTAGE: ALWAYS 1 FULL 20-MARK QUESTION IN EVERY PAPER.

💡 MOST REPEATED / EXPECTED

1️⃣ EXPLAIN CNN ARCHITECTURE IN DETAIL.

2️⃣ EXPLAIN CONVOLUTION & POOLING OPERATIONS WITH EXAMPLES.

3️⃣ COMPARE FULLY CONNECTED NN AND CNN.

4️⃣ EXPLAIN LENET / ALEXNET / RESNET ARCHITECTURE.

5️⃣ DEFINE PADDING, STRIDE, FILTER SIZE AND GIVE OUTPUT FORMULA:

$$O = \FRAC{(I - F + 2P)}{S} + 1$$

☑️ MOST LIKELY:

CNN ARCHITECTURE (Q2 FROM DEC 2023, JUNE 2025, AND MAY 2024 PYQS)

LENET OR RESNET (1 MODERN CNN ARCHITECTURE ALWAYS APPEARS).

MODULE 5 — RECURRENT NEURAL NETWORKS (RNN)

WEIGHTAGE: 1 MAJOR QUESTION EVERY PAPER

MOST REPEATED / EXPECTED

1. EXPLAIN RNN ARCHITECTURE WITH DIAGRAM AND EQUATIONS.

2. EXPLAIN LSTM ARCHITECTURE AND HOW IT SOLVES THE VANISHING GRADIENT PROBLEM.

3. EXPLAIN GRU (GATED RECURRENT UNIT) ARCHITECTURE.

4. EXPLAIN VANISHING & EXPLODING GRADIENT PROBLEM.

5. EXPLAIN BACKPROPAGATION THROUGH TIME (BPTT).

MOST LIKELY:

RNN + LSTM COMBO QUESTION

VANISHING/EXPLODING GRADIENTS SHORT NOTE

▨ MODULE 6 — RECENT TRENDS & APPLICATIONS

🔥 WEIGHTAGE: 1 QUESTION EVERY PAPER (FINAL QUESTION)

💡 MOST REPEATED / EXPECTED

1. EXPLAIN GAN (GENERATIVE ADVERSARIAL NETWORK) ARCHITECTURE IN DETAIL.

2. WRITE GAN FORMULA:

\MIN_G \MAX_D V(D, G) = E_{X \SIM P_{DATA}(X)}[\LOG D(X)] + E_{Z \SIM P_Z(Z)}[\LOG(1 – D(G(Z)))]

4️⃣ WRITE A SHORT NOTE ON DEEPFAKE.

5️⃣ EXPLAIN ISSUES IN VANILLA GAN (INSTABILITY, MODE COLLAPSE).

☑️ MOST LIKELY:

GAN ARCHITECTURE + FORMULA (REPEATED IN 3 OUT OF 4 PAPERS).

DEEPFAKE (1-LINE OR SUB-QUESTION).

🔥 FINAL 12 “MUST-PREPARE” QUESTIONS (COVERING 80 MARKS)

- [x] 1. MLP ARCHITECTURE AND WORKING (MODULE 1)
- [x] 2. GRADIENT DESCENT (MODULE 1)
- [x] 3. BACKPROPAGATION WITH EQUATIONS (MODULE 2)
- [x] 4. COMPARE OPTIMIZERS (MOMENTUM, RMSPROP, ADAM) (MODULE 2)
- [x] 5. REGULARIZATION (DROPOUT, BATCHNORM, EARLY STOPPING) (MODULE 2)
- [x] 6. AUTOENCODER ARCHITECTURE (MODULE 3)
- [x] 7. CNN ARCHITECTURE AND WORKING (MODULE 4)
- [x] 8. LENET / RESNET ARCHITECTURE (MODULE 4)

- [x] 9. RNN ARCHITECTURE (MODULE 5)
- [x] 10. LSTM ARCHITECTURE (MODULE 5)
- [x] 11. GAN ARCHITECTURE + FORMULA (MODULE 6)
- [x] 12. APPLICATIONS OF GAN / DEEPFAKE (MODULE 6)