

Answer Key & Explanations

Applied AI (6COSC020C.1) - Mock Test 02 (2025)

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Overview

This document contains the solutions and detailed explanations for the Applied AI Mock Test 02. The questions have been categorized by topic to assist with revision.

1 Neural Networks & Machine Learning

Q1: Learning in Neural Networks happens through the adjustment of weights.

Correct Answer: A) True

Explanation: Neural networks learn by using optimization algorithms (like Gradient Descent) to iteratively adjust weights and biases to minimize the error between predicted and actual outputs.

Q5: Identify the type of learning in which only labelled training data is used.

Correct Answer: D) Supervised learning

Explanation: Supervised learning relies on input-output pairs (labels). Unsupervised learning uses unlabeled data, and Reinforcement learning uses rewards/penalties.

Q6: Design a neural network to classify samples into 5 groups, where each sample is represented by 3 values.

Correct Answer: A) Input layer with 3 inputs, output layer with 5 outputs...

Explanation: The input layer size must match the number of features (3 values), and the output layer size must match the number of target classes (5 groups).

Q8: You have a balanced dataset with 1000 samples. Which data split strategy is correct?

Correct Answer: C) 80% train, 10% validation, 10% test

Explanation: This split ensures enough data is available for training while reserving separate subsets for hyperparameter tuning (validation) and final evaluation (test).

Q12: What is the primary function of RELU activation function?

Correct Answer: D) To introduce non-linearity into the model...

Explanation: Without activation functions like ReLU (Rectified Linear Unit), a neural network would mathematically collapse into a linear regression model. ReLU allows the network to learn complex, non-linear boundaries.

Q15: Which loss function is most commonly used for multi-class classification problems?

Correct Answer: A) Categorical Cross-Entropy loss

Explanation: Categorical Cross-Entropy is designed for multi-class tasks (e.g., Class A vs B vs C). Binary Cross-Entropy is for two classes, and MSE is typically for regression.

2 Computer Vision & CNNs

Q2: In computer vision, classification is more difficult than segmentation.

Correct Answer: B) False

Explanation: Segmentation is more difficult because it requires assigning a label to every individual pixel (pixel-level accuracy), whereas classification only assigns a single label to the entire image.

Q9: Input volume $32 \times 32 \times 3$. Applying 10 5×5 filters with stride 1, padding 2, what is the output feature volume?

Correct Answer: C) $32 \times 32 \times 10$

Explanation: The spatial output dimension formula is:

$$\text{Output} = \frac{W - K + 2P}{S} + 1$$

$$\text{Output} = \frac{32 - 5 + 2(2)}{1} + 1 = \frac{31}{1} + 1 = 32$$

The depth is equal to the number of filters (10). Thus, the volume is $32 \times 32 \times 10$.

Q10: In question 9, how many parameters are in this convolutional layer?

Correct Answer: A) 760

Explanation: Parameters = (Filter Width \times Filter Height \times Input Depth + Bias) \times Num Filters.

$$(5 \times 5 \times 3 + 1) \times 10$$

$$(75 + 1) \times 10 = 76 \times 10 = \mathbf{760}$$

Q11: What is the primary purpose of convolutional layers in a CNN?

Correct Answer: B) To extract spatial features such as edges, textures, and patterns

Explanation: Convolution layers scan the image with filters to detect features. Dimensionality reduction is typically performed by Pooling layers.

3 Generative AI & LLMs

Q3: ChatGPT uses LSTM models.

Correct Answer: B) False

Explanation: ChatGPT uses the **Transformer** architecture (specifically GPT - Generative Pre-trained Transformer), which relies on self-attention mechanisms, not LSTMs.

Q4: Generative AI models learn patterns... to generate new data.

Correct Answer: A) True

Explanation: Generative models (like GANs, VAEs, Diffusion) differ from discriminative models by creating *new* data instances that resemble the training distribution.

Q7: Select the primary purpose of large language models (LLMs).

Correct Answer: B) To process and understand vast amounts of natural language data

Explanation: While they can perform translation or summarization, their core definition is the large-scale probabilistic processing and generation of language.

Q13: What is a key characteristic of a Large Language Model (LLM)?

Correct Answer: C) It uses billions of parameters to understand and generate human-like text

Explanation: LLMs are characterized by massive scale (billions of parameters) and their ability to handle unstructured text data.

Q14: Which technique is commonly used to fine-tune an LLM for a specific task?

Correct Answer: D) Transfer learning with task-specific data

Explanation: Training LLMs from scratch is resource-intensive. Transfer learning allows taking a pre-trained model and fine-tuning it on a smaller, specific dataset.