

Course: Generative AI Models

Question Bank

Unit 1

1	Explain the purpose of the self-attention mechanism in a Transformer model with a simple analogy.
2	Write Short note on Transfer Learning Strategies.
3	Compare autoregressive LLMs like GPT with encoder-decoder models in terms of architecture and applications.
4	Design a simple self-attention mechanism for a sentence with three words: "AI is powerful". Using basic numerical vectors for query (Q), key (K), and value (V), Justify how attention scores and the final output vectors will be represented.
5	Illustrate the importance of tokenization in training and deploying LLMs.
6	<p>Justify how the encoder in a Transformer model works by analyzing its layered structure and components. Consider the example "Cats chase mice" to support your explanation. Your answer should include:</p> <ul style="list-style-type: none">• The purpose of token embedding and positional encoding• The role of self-attention in capturing word relationships
7	<p>AI research team is developing a smart summarization tool for legal documents using a Transformer-based architecture. During initial testing, they noticed that the tool often misses critical dependencies between keywords that are far apart in the document. For example, in the sentence:</p> <p>"The agreement signed on 12th March, which includes clauses concerning payment and liability, shall remain effective until terminated."</p>
8	<p>The model failed to correctly relate "<i>agreement</i>" with "<i>terminated</i>", although they are semantically linked.</p> <ul style="list-style-type: none">• The team suspects that their encoder isn't capturing long-range dependencies effectively. Justify your answer, how self-attention learns contextual importance and boosts summarization accuracy.• The function of feed-forward layers
9	How multiple encoder layers refine word representations?
10	Summarize the importance of pre-training in Large Language Models before fine-tuning them for specific tasks.
11	Identify and analyze pre-training techniques Mask Language Modeling. Next Sentence Prediction
12	Elaborate the Encoder process in Transformer

13	Describe the main layers of the Transformer architecture and their functions
14	Describe the main layers of the Transformer architecture and their functions
15	Evaluate the effectiveness of fine-tuning in improving LLM performance on specific tasks. Illustrate your answer with an example from legal document summarization
16	Describe the role of transfer learning in improving the efficiency of training large AI models.
17	Describe the role of transfer learning in improving the efficiency of training large AI models.
	Unit 2
1	Compare the three generations of GPT models based on various factors
2	Compare the three generations of GPT models (GPT-2, and GPT-3) based on the following factors: <ul style="list-style-type: none"> 1. Model architecture and number of parameters 2. Language modelling capabilities 3. Text generation performance 4. Limitations and challenges
3	Why GPT is Used in Dialogue Systems
4	Justify the purpose of multi-head attention in GPT and how it improves over single-head attention when learning language patterns.
5	Justify Text Generation Techniques with GPT Models:
6	Analyze the impact of the GPT-based Chabot on E-Shop's customer satisfaction and operational efficiency. Include both benefits and potential drawbacks in your analysis.
7	Use a GPT model to generate a product description for an online store and refine it to improve clarity and engagement.
8	Illustrate three practical applications of GPT-1.
9	What challenges arise when using GPT models for real-time dialogue generation?
10	Analyze the privacy and ethical concerns associated with deploying a GPT-based chatbot on an e-commerce platform.
11	Case Study: Implementing GPT-based Tasks in a Customer Support System for an E-commerce Business.

12	Use GPT-2 and GPT-3 to generate responses to the same query and analyze how the responses differ.
13	Apply GPT-generated dialogue to a virtual assistant and analyze its ability to mimic human-like conversation flow.
14	Analyze impact of GPT-based chatbot on e-commerce
15	Apply GPT-4 to generate responses for a customer complaint escalation system and evaluate its effectiveness
16	Fine-tune a GPT-4 model using reinforcement learning from customer interactions and measure its improvement in conversation flow.
UNIT 3	
1	Illustrate how BERT uses bidirectional attention to understand context.
2	Elaborate any four applications of BERT
3	Justify why BERT performs better than unidirectional language models in Question answering tasks.
4	How does masked language modeling (MLM) help BERT learn contextual representations?
5	Analyze how pre-training followed by fine-tuning enables generative models to perform downstream tasks efficiently. Justify your answer for text summarization.
6	How to use BERT model in NLP?
7	Apply adversarial attacks to a fine-tuned BERT model and analyze how it affects model predictions.
8	Feed a short text into a pre-trained BERT model and observe how it generates contextual word embeddings
9	Use BERT embeddings to cluster similar sentences and interpret the results.
10	Differentiate between BERT and GPT
11	Justify why BERT performs better than unidirectional models
12	Explain BERT embeddings for multi-label text classification and analyze its effectiveness.
13	What are the advantages of fine-tuning BERT instead of training a model from scratch for a specific NLP task?
14	Discuss a BERT-based chatbot that can answer customer queries using a pre-trained model.
15	Modify the attention mechanism in a Transformer model and analyze how it affects text representation.

16	How does masked language modeling help BERT
17	Fine-tune a BERT-based model for spam detection and evaluate its accuracy on a sample dataset.
	UNIT 4
1	Analyze the effectiveness of LLMs in content generation for blogs and news articles compared to human-written content.
2	Discuss the challenges and limitations of Large Language Models (LLMs) in real-world applications.
3	A diagnostic centre uses an LLM fine-tuned on large medical datasets to assist doctors in identifying possible diagnoses based on patient symptoms and history. It suggests lab tests and potential diseases.
4	Examine the impact of LLMs in enhancing diagnostic accuracy. Discuss benefits and challenges in: <ul style="list-style-type: none"> Assisting junior doctors or rural clinics Risks of bias or hallucination in critical medical decisions
5	Investigate how large language models are transforming the healthcare industry through applications like automated diagnosis and medical record summarization
6	Elaborate emerging trends and future directions in Generative AI?
7	Identify the key ethical concerns in using LLMs for social media content moderation.
8	An AI tool powered by LLMs is used to summarize long patient records into one-page briefs for referrals and second opinions. Doctors can then review patient history quickly. Analyze how medical record summarization using LLMs can improve patient care. Include: <ul style="list-style-type: none"> Challenges in summarizing critical details Risk of omitting rare symptoms or outliers
9	Evaluate the role of generative AI in personalized education and its potential limitations in adaptive learning systems.
10	Compare and contrast traditional AI models with Generative AI models.
11	Discuss the challenges and limitations of Large Language Models (LLMs) in real-world applications.
12	Investigate the implications of copyright and intellectual property laws on AI-generated content

	Given the challenges of bias and misinformation in LLMs, what strategies should researchers and developers use to improve fairness and reliability in AI-generated content?
13	Mention any two challenges faced in using generative AI models in healthcare.
14	What is the role of RLHF in language model alignment?
15	Give two examples of ethical concerns in using generative models.
16	What is domain adaptation in generative AI?
17	Mention any two challenges faced in using generative AI models in healthcare.
18	Why are AI governance and regulations becoming important