**MSc AI (SEMESTER II)**

**PRACTICAL**

**GENERATIVE AI**

**INSTRUCTIONS**

1. Every Student will create
2. All practicals, code, and README files will be hosted in a single GitHub repository.
3. Students will work on the main branch and submit their work by providing the GitHub link.
4. Each practical will be saved in a folder named as such as 01\_Introduction to Generative AI Platforms and it will have notebook, data (if needed) and a readme file for notes/instruction.
5. This is an interactive course hence students are advised to participate and help each other for a better experience.

**ASSESSMENT**

The **END SEMESTER EXAMINATION** will be based on the individual thinking, query resolution skills and practical experience and application of the concepts learned during the course.

**OUTCOMES**

Students will gain practical experience with various Generative AI technologies and create projects tailored to their individual domains.

**INDEX**

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| **PRACTICAL** | **TITLE** | **DATE** |
| 1 | **Introduction to Generative AI Platforms**   1. Explore platforms like Claude, Chatbots, and Gemini AI. 2. Learn to utilize these platforms for tasks such as resume improvement, study plan creation, and code debugging. 3. Create an essay using a Generative AI application, evaluate its quality, and compare the results. 4. Create a Python notebook, paste your prompts and generated essays, and include their evaluations based on quality. |  |
| 2 | **Prompt Engineering**   1. Investigate how the structure of a prompt affects the output using a single model (e.g., MistralAI 7.0.2 GGUFVersion with C-Transformer). 2. Experiment with multiple prompts in Google Colab. |  |
| 3 | **Hugging Face Models for NLP and Computer Vision**   1. Use Hugging Face models for tasks including sentiment analysis, text summarization, text-to-text generation, image generation, and image segmentation. |  |
| 4 | **Introduction to Hugging Face Hub, Spaces, and Models**   1. Learn about different types of LLM model quantization. 2. Explore how to use Hugging Face Hub, Spaces, and Models. 3. Download models and create a basic Hugging Face Space to deploy a simple application (e.g., sentiment analysis) live. |  |
| 5 | **Basic Fine-tuning of BERT for NLP Tasks**   1. Fine-tune a BERT model for tasks like sentiment analysis or Named Entity Recognition (NER). 2. Push the fine-tuned model to Hugging Face Hub. |  |
| 6 | **Advanced Fine-tuning Techniques**   1. Explore advanced fine-tuning methods such as Bitsandbytes, PEFT, and QLorA. 2. Build and fine-tune a model for creating a mental health chatbot. 3. Push the fine-tuned model to Hugging Face Hub. 4. Learn about using LangChain with Vector Databases. |  |
| 7 | **Introduction to Retrieval-Augmented Generation (RAG)**   1. Understand the concepts of RAG, Vector Databases, Embeddings, Similarity, and Context-based Answering using LLMs. |  |
| 8 | **Memory/Context-aware Chatbot using RAG**   1. Build a memory/context-aware chatbot using RAG. |  |
| 9 | **Final Project**   1. Students will work on a final project of their choice (a simple project related to their individual domains). 2. Push the project to the individual student's branch in the GitHub repository. |  |
| 10 | **Use Cases** |  |