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Academic Year 2024-25 (Even Semester)

USN | 1 | R | V | 2 | 2 | AI | 0 | 07 |

Department of Artificial Intelligence and Machine Learning

Course Code : AI365TDD
Semester : VI Semester
Max Marks : 10 + 50

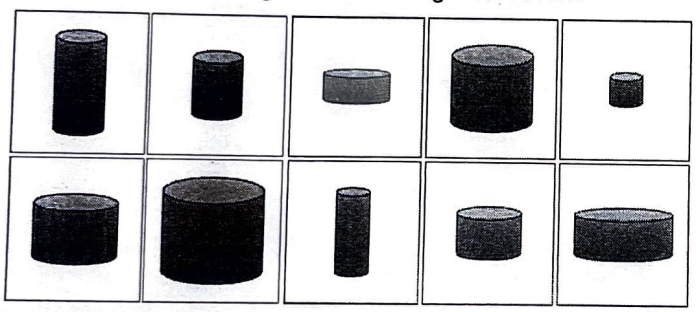
Date : 02/05/2025
Time : 9:30 – 11:30
Duration : 120 mins

CIE 1

Generative Artificial Intelligence

Note: Answer all the Questions

Q. No	PART A QUIZ 1 Questions	M	BT	CO
1 a)	Write the mathematical notation of Discriminative Modelling Estimate and Generative Modelling Estimate	2	1	1
1 b)	How can binary classification be applied to develop an artist discriminator for identifying Van Gogh's paintings?	2	1	1
1 c)	Define Positional Encoding	2	2	2
1 d)	What is the role of the embedding layer in Large Language Models?	2	1	1
1 e)	In the context of Variational Autoencoders (VAEs), the generated outputs are often unrealistic if the latent space is poorly structured. Provide an example of how the latent space can be regularised to improve the quality of generated data.	2	1	1

Q. No	PART B CIE 1 Questions	M	BT	CO
1	Compare and contrast **Discriminative** and **Generative** models in the context of machine learning. Include suitable examples to illustrate your points. Support your answer with a diagram and discuss the key advantages of each approach	10	3	1
2	Explain the architecture of a Large Language Model (LLM) and discuss its functionalities.	10	2	1
3	Consider a generative model trained on images of biscuit tins, which maps a low-dimensional latent space to the image domain using a function *f*.  **Figure: Biscuit tin data set** **a)** Explain how manipulating the latent vector can lead to interpretable and high-level modifications in the output image. **b)** Describe the advantages of using such a latent space representation over direct pixel-level manipulation. Support your answer with an example transformation (e.g., making the tin taller) and explain the process in detail.	10	3	2
4	Discuss the architecture of **Auto Encoders** along with its components.	10	2	2
5	In forensic handwriting analysis, investigators often face challenges due to limited or poor-quality handwriting samples. To address this, a Variational Autoencoder (VAE) is proposed to simulate synthetic handwriting data mimicking real samples, aiding in forensic handwriting pattern analysis and signature verification. **a)** Explain how the latent space in a VAE captures handwriting variations, using a suitable example. **b)** Describe the reparameterization trick and its role in training the VAE for forensic handwriting simulation.	10	4	3

M-Marks, B-Bloom's Taxonomy Levels, CO-Course Outcomes

Marks Distribution

Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Max Marks CIE	28	22	10	-	8	22	20	10	-	-