RV College of Engineering®
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Department of Artificial Intelligence and Machine Learning

Date: 25.06.2025	Improvement Test	Max. Marks: 50+10
Semester: VI	UG	Duration: $1\frac{1}{2}$ Hrs + ½ Hr
Course Title: **Generative Artificial Intelligence**		Course Code: **AI365TDD**

Part A

Q. No		PART A Improvement QUIZ Questions	M	BT	CO
1	a)	What is an Energy-Based Model (EBM)?	2	1	3
	b)	How does Langevin Dynamics help in sampling for Energy-Based Models	2	2	3
	c)	Define **algorithmic bias** and **data bias** in the context of generative AI	2	1	4
	d)	What is **statistical parity**, and how is it used to measure fairness in AI models?	2	2	5
	e)	Compare **pre-processing** and **post-processing** techniques for bias mitigation in AI models	2	2	5

Part B

Q. No	PART B Improvement Test Questions	M	B	CO
1	Given an Energy-Based Model (EBM) trained on the MNIST dataset, explain how Langevin Dynamics is used for sampling new digit images. Illustrate the process with mathematical equations	10	2	3
2	Consider an EBM Energy Function E (x, θ) where x is input and θ is parameter. a. Explain how the energy function influences the model's ability to generalize to unseen data. (5M) b. Compare this with traditional likelihood-based generative models(5M)	10	3	3
3	Generative AI models can inherit biases from various sources, including data, algorithms, and societal structures. a. Critically analyse the impact of **algorithmic, data, and societal biases** on generative AI outputs. (5m) b. Provide real-world examples where these biases have led to ethical concerns. (5m) c. Propose an approach to systematically evaluate and reduce bias in a generative AI system. (5m)	15	4	4
4	Fairness in AI is measured using different metrics such as **statistical parity, equal opportunity, and disparate impact**. a. Compare these fairness metrics in terms of their applicability and limitations in generative AI models. (5m) b. Evaluate the effectiveness of **pre-processing, in-processing, and post-processing** mitigation strategies in addressing bias. (5m) c. Suggest an optimal bias mitigation strategy for a generative AI model used in hiring decisions and justify your choice. (5m)	15	4	5