B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E.   **Semester: V**

Branch: CSE(DS)/AI & DS   **Duration: 3 hrs.**

Course Code: 23DS5PERAI   **Max Marks: 100**

Course: Responsible AI

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Define the Responsible Life Cycle for AI Systems with a diagram.	CO1	PO1	**05**
	b)		Design a comprehensive strategy for a company which is launching a self-driving car focusing on ensuring the incorporation of autonomy, adaptability and interaction characteristics of the AI system in the product.	CO1	PO1	**09**
	c)		Explain Beliefs, Desires and Intention (BDI) Model with an example scenario.	CO1	PO1	**06**
			OR			
2	a)		Design an approach to implement the HABA-MABA framework for a Customer Support Chatbot. Explain how this framework can be utilized to enhance the chatbot's efficiency and effectiveness.	CO3	PO4	**06**
	b)		To design a Robo Room Cleaner for company ABC, analyze the various levels of autonomy that can be assigned to the device. Provide a detailed scenario for each level, demonstrating how the Robo Room Cleaner would operate and adapt in different situations.	CO2	PO2	**06**
	c)		Analyze how to design a Responsible AI System integrating Design for values and Domain Requirement from software engineering ensuring the AI System aligns with ethical principles, stakeholder values and domain specific requirements.	CO2	PO2	**08**
			UNIT - II			
3	a)		Assess how AI leads to: • opportunities in enabling human self-realization • enhancing human agency • increasing societal capabilities • fostering societal cohesion.	CO1	PO1	**10**

		Additionally, examine the potential risks associated with the overuse or misuse of AI in these areas.				
	b)	Design an organizational framework that addresses the five risks of being unethical (ethics shopping, ethics bluewashing, ethics lobbying, ethics dumping, and ethics shirking) while implementing principles of digital ethics in AI-driven projects.	CO3	PO4	**10**
		OR				
4	a)	Company XYZ wants to build a trustworthy AI System, Identify the seven essentials the company needs to consider for building trustworthy AI System.	CO1	PO1	**07**
	b)	Evaluate the ethical implications of algorithms related to epistemic concerns: inconclusive evidence, inscrutable evidence, and misguided evidence. Provide examples for each, discussing their impact on reliability and trustworthiness.	CO1	PO1	**09**
	c)	Elaborate how Participatory Design and Social Contract Models ensures ethical and adaptable approach to algorithm development.	CO1	PO1	**04**
		UNIT - III				
5	a)	Identify the need for the usage of Typology and explain the Applied AI Ethics Typology comprising the ethical principles and stages of algorithmic development.	CO1	PO1	**10**
	b)	Outline the key challenges that the financial sector encounters when trying to implement AI system.	CO1	PO1	**05**
	c)	Analyze the requirements outlined by the FCA regarding the definition and management of algorithmic trading, and what steps must firms take to comply with these requirements?	CO1	PO1	**05**
		OR				
6	a)	A bank is using an AI model to approve loan applications. How can the bank ensure that its AI model achieves Demographic Parity, ensuring that the approval rate of loan applications is the same across different demographic groups, such as race and gender.	CO3	PO4	**10**
	b)	How can an organization establish an effective Development and Testing Process, Governance and Oversight, Documented Change Management and ensure Transparency and Explainability in their AI projects.	CO1	PO1	**10**
		UNIT - IV				
7	a)	Imagine you are part of an auditing team for a health website that promises not to share user activity data with third parties. What steps would you take to perform an Adversarial Test to ensure that the website is not compromising customer data.	CO3	PO4	**06**
	b)	An organization developing an image classification tool notices that the tool's performance varies significantly across different	CO3	PO4	**08**

			regions and cultural contexts. What is the potential reason for failure and how to overcome these issues.			
		c)	Differentiate between Taste-Based Discrimination and Statistical discrimination.	CO2	PO2	**06**
			OR			
8		a)	Discuss any five traditional tests carried out by researchers to detect discrimination in the system.	CO1	PO1	**10**
		b)	Analyze how an organization can ensure fairness across different demographic groups by using various algorithmic fairness techniques.	CO3	PO4	**06**
		c)	Identify the potential harms associated with implementing search and recommendation systems.	CO1	PO1	**04**
			UNIT - V			
9		a)	Given the following scenarios, identify whether interpretability in AI is essential or not by providing justification to your answer. i) A hospital is using an AI system to predict patient re-admission rates. ii) A social media platform uses an AI algorithm to curate a user's news feed. iii) A financial institution uses AI to approve or deny loan applications. iv) A self-driving car uses AI to make real-time driving decisions. v) A music streaming service uses AI to create personalized playlists.	CO2	PO2	**05**
		b)	Differentiate between Counterfactual Explanations and Anchor Model Agnostic methods.	CO2	PO2	**08**
		c)	Anna builds a classification model that predicts whether a person has a risk of diabetes based on their health data. Interpret how Local Interpretable Model-agnostic Explanations can gain insights into the predictions.	CO3	PO4	**07**
			OR			
10		a)	Identify the need for interpretability and explain the key traits enhanced by using model interpretability.	CO2	PO2	**08**
		b)	Consider a loan approval system, how does explainable machine learning transform real world raw applicant data (such as credit history, income, and debt-to-income ratio) into interpretable explanations that help loan officers to make informed decisions about approving or rejecting a loan application.	CO3	PO4	**08**
		c)	Explain the usage of Partial Dependence Plot on a model.	CO1	PO1	**04**

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