Register Number:……..

KUMARAGURU
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M.E DEGREE EXAMINATIONS: NOV / DEC 2024

(Regulation 2024)

First Semester

EMBEDDED SYSTEM TECHNOLOGIES

24ETT504: AI and ML for Embedded Systems

COURSE OUTCOMES

CO1: Understand the process of developing machine learning models for embedded systems

CO2: Understand the basic concepts and algorithms in ML and DL

CO3: Understand the optimum use of ML libraries in model deployment

CO4: Analyze the Embedded Hardware and the mode of deployment using ML algorithms for simple applications

CO5: Design and deploy Machine learning models for resource constrained environment

Time: Three Hours **Maximum Marks: 100**

PART A (4*20 = 80 Marks)

1.	a)	Enumerate the factors to be considered while designing an embedded system. Discuss briefly.	08	CO1	[K_2]
	b)	What are the components of an embedded system? How does it differ from the general-purpose system? Describe a use-case where AI algorithms improve decision making in embedded systems.	12	CO1	[K_3]
2.	a)	Explain the layers of Keras framework. What is a sequential model and functional model in Keras?	08	CO3	[K_2]
	b)	What is wake word detection? How it works? What is the role of Tensor Flow framework in wake word detection in the model deployment phase?	08	CO3	[K_4]
	c)	What is TensorFlowLite framework for microcontrollers? How is it different from TensorFlow?	04	CO3	[K_2]
3.	a)	Describe the architecture of STM32 and its peripheral support with relevant diagrams.	10	CO4	[K_2]
	b)	What is the role of an audio data logger? How is it used in audio	10	CO4	[K_3]

classification? Explain the interfacing of audio dataloggers with STM32 using relevant code snippets.

4.	a)	How is motor fault detection performed in a traditional method and using machine learning model? Compare.	04	CO5	[K_3]
	b)	Explain detection and classification for AC motor or DC motor using a suitable model.	08	CO5	[K_4]
	c)	What are the steps involved in building and training a model by interfacing sensor to a suitable microcontroller? Elucidate.	08	CO5	[K_2]

Answer any ONE Question
PART B (1*20 = 20 Marks)

5.	a)	What leads to underfitting and overfitting in model training? How is it different from balanced fit? What are ways to reduce overfit and underfit? Brief with relevant diagrams .	12	CO2	[K_2]
	b)	Outline the conceptual differences between Supervised, Unsupervised and Reinforcement learning types of machine learning with relevant diagrams and an example real-life application for each. .	08	CO2	[K_3]

OR

6.	a)	State the primary objective of classification, regression and clustering in machine learning. Also, Compare in terms of application and output. List the algorithms used for each type .	08	CO2	[K_3]
	b)	What is Convolution Neural Network(CNN)? How is it used to extract features? Explain the significance of filters/kernels and the function of each layer with a suitable diagram.	12	CO2	[K_2]

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