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Mid Term Examinations - October 2026

Date: 06/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: ECE3191 **Course Name:** AI Applications in Intelligent and Embedded Systems

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	24	22	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	What is a real-time embedded system? Give one suitable example.	2	CO1	BT2
2	What is the role of an actuator in an embedded system? Give one example.	2	CO1	BT2
3	Differentiate between Machine Learning and Rule-based Systems.	2	CO2	BT2
4	Distinguish between analog and digital signals with one example each.	2	CO3	BT2
5	What is time-series data? Give one example of time-series data generated by an embedded sensor.	2	CO3	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Explain the evolution and key characteristics of embedded systems. Discuss how dedicated functionality, resource constraints, and real-time requirements influence their design.	10	CO1	BT2
7	Explain the key components of an IoT-enabled embedded system. With a suitable block diagram, describe how sensors, a microcontroller, communication interfaces, and connected services work together to exchange data.	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Apply the working principle of the major branches of Artificial Intelligence, namely Machine Learning, Deep Learning, and Rule-based Systems to determine their relevance and implementation strategy for a specific embedded application.	10	CO2	BT3
9	A smart irrigation system uses sensor data to decide when to water crops. Explain how supervised, unsupervised, and reinforcement learning could be applied to this system. Identify the type of data or feedback required for each approach.	10	CO2	BT3

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT

10	Explain the role of sensors in intelligent embedded systems. Discuss temperature, motion, sound, light, and pressure sensors, including the type of information each provides to an AI system.	10	CO3	BT2
11	Explain the stages of an AI data pipeline, starting from raw sensor data collection to the generation of useful AI input. Discuss the importance of data cleaning, preprocessing, and feature extraction at each relevant stage.	10	CO3	BT2

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	An embedded system collects accelerometer data for gesture recognition. Analyze how sampling, normalization, windowing, and feature extraction can be used to convert raw time-series readings into suitable inputs for an AI model.	10	CO3	BT4
13	An intelligent embedded device must collect sensor data and respond to sudden events while performing AI inference. Analyze the roles of interrupt-driven data collection, edge preprocessing, and real-time versus batch processing in meeting the system's requirements.	10	CO3	BT4