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Bengaluru

Mid Term Examinations - October 2026

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

Course Code: ECE3086 **Course Name:** Industrial Internet of Things

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

CO - Levels	CO1	CO2	CO3	CO4
Marks	24	22	22	22

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Identify and discuss a few prominent real-world applications of the Internet of Things (IoT) technology.	2	CO1	BT2
2	Provide a definition of the concept of Cyber-Physical Systems (CPS) within the context of the IoT domain.	2	CO1	BT2
3	Identify the four basic structural frameworks pertaining to the Industrial Internet of Things (IIoT) domain.	2	CO2	BT2
4	Elucidate the concept of a Smart Factory, highlighting how it fundamentally differs from a traditional automated factory setup.	2	CO3	BT2
5	A automobile factory is scheduled to run for 8 hours (480 min) per shift. IIoT sensors log 30 min of unplanned stoppages (Availability), an actual cycle rate that is 92% of the ideal rate (Performance), and a first-pass yield of 98% (Quality). Calculate the Overall Equipment Effectiveness.	2	CO4	BT3

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Depict the hierarchical reference architecture underlying an IIoT-based smart factory system, and provide a detailed explanation of the purpose served by each layer within this architecture.	10	CO1	BT2
7	Compare and differentiate among IoT, IIoT, and the Industrial Internet in terms of their respective domains of application, reliability and dependability requirements, and representative real-world applications.	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Examine the progressive development of industrial manufacturing from Industry 1.0 to Industry 5.0, highlighting the defining technological advancement and underlying value proposition at each stage, and specifically elaborating upon the key differentiators between Industry 4.0 and Industry 5.0.	10	CO2	BT2
9	Illustrate and explain, through a flowchart representation, the sequential workflow involved in the predictive maintenance of rotating machinery.	10	CO2	BT2

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT

PTO (Please Turn Over)

10	Define a vibration sensor, and elucidate its underlying working principle with the aid of a clear schematic diagram and governing equations, in the context of Industrial Internet of Things (IIoT) applications.	10	CO3	BT2
11	Elucidate the fundamental operating concept of a temperature sensor, supported by appropriate schematic diagrams and pertinent governing equations.	10	CO3	BT2

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Consider a piezoelectric accelerometer characterized by a charge sensitivity d_{33} = 250 pC/g (where g = 9.81 m/s²), coupled to a charge amplifier with a feedback capacitance Cf = 2000 pF. For a vibration acceleration of 4g acting on a seismic mass of m = 1 kg, calculate the corresponding output voltage.	10	CO4	BT3
13	(a) A Pt100 Resistance Temperature Detector (RTD) exhibits a resistance R_0 = 100 Ω at 0°C, with a temperature coefficient of resistance α = 0.00385 /°C. Determine its resistance at 150°C, along with the corresponding percentage variation in resistance relative to its value at 0°C. (b) Given a Type-K thermocouple possessing a Seebeck coefficient of approximately 41 µV/°C in the vicinity of room temperature, estimate the resultant output EMF when the hot junction is maintained at 250°C and the cold (reference) junction at 25°C.	10	CO4	BT3