

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: ECE**

**SEMESTER: VI
SESSION: SP/2025**

SUBJECT: EC357 INTRODUCTION TO INDUSTRIAL INSTRUMENTATION

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a)	State the advantages of Fiber-optic sensors and Silicon sensors. Using a suitable diagram, describe how a silicon sensor is used to measure liquid flow.	[5] 1	2
Q.1(b)	Discuss the performances of organic and inorganic scintillators. Demonstrate the construction and working of the scintillation counter.	[5] 1	2
Q.2(a)	Name different types of analog-to-digital (A/D) and digital-to-analog (D/A) conversion techniques. Illustrate in detail the successive approximation method of A/D conversion.	[5] 2	2
Q.2(b)	Explain the different categories of Pneumatic cylinders and their applications. What are the deciding factors for Pneumatic cylinder?	[5] 2	2
Q.3(a)	Explain the construction and working of Direct Digital Control (DDC) with the help of a block diagram. Outline the advantages and applications of DDC.	[5] 3	3
Q.3(b)	Describe in control system parameters (i) Error and (ii) Dead Time. Discuss in brief various continuous controller modes with mathematical expressions.	[5] 3	3
Q.4(a)	Draw the architecture of PLC and describe its components in detail. What are two PLC operation modes? Describe both modes briefly.	[5] 4	2
Q.4(b)	Describe the programming languages commonly used with programmable controller-based systems. Illustrate the following expression using a ladder diagram and provide an explanation $Y_1 = (X_1 \cdot OR \cdot X_2) \cdot AND \cdot (C_1 \cdot OR \cdot (NOT \cdot C_2)) \cdot AND \cdot X_3$	[5] 4	4
Q.5(a)	Sketch the block diagram of the Predictive control approach for controlling a process and explain its working. Differentiate between predictive control and adaptive control.	[5] 5	3
Q.5(b)	Compare proportional-integral-derivative (PID) controller and fuzzy controller. Explain the main constituents and working of the fuzzy controller using a block diagram.	[5] 5	2

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