

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATIONS-2023

M.Tech.-I Semester (CS/IT/ECE/Civil/BT)

COURSE CODE (CREDITS): 21M11EC111 (3)

MAX. MARKS: 15

COURSE NAME: SENSOR AND SMART INSTRUMENTATION

COURSE INSTRUCTOR(S): Dr. HARSH SOHAL

MAX. TIME: 1 Hour

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*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.*

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Q1. [CO1][5](a) Define and explain the following terms (in reference to measurement systems) with suitable examples. [3]

(i) Transducer            (ii) Precision    (ii) Actuator

(c) A 0-250 V voltmeter has a guaranteed accuracy of 1 per cent full-scale reading. The voltage measured by this meter is 110 V. Calculate the limiting error in percentage. [2]

Q2. [CO2] [4] A voltmeter, having a sensitivity of  $1500 \Omega/V$ , reads 120 V on its 150-V scale when connected across an unknown resistor in series with a milli Ammeter. When milli Ammeter reads 4 mA, calculate

i. The *apparent* resistance of the unknown resistor; [1]

ii. The *actual* resistance of the unknown resistor; [1]

iii. The *error* (in percentage) due to the loading effect of the voltmeter. [2]

Also draw circuit diagram(s).

Q3. [CO1, CO2][6] (a) What are the criteria for transducer selection for an application? Why the transducer selection is considered very important in measurement systems? [3]

(b) Explain the concept of a smart sensor with suitable example using block diagrams. List various advantages and disadvantages w.r.t. traditional sensors. [3]