

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION-2022

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

COURSE CODE (CREDITS): 21M11EC111 (3)

MAX. MARKS: 25

COURSE NAME: SENSOR AND SMART INSTRUMENTATION

COURSE INSTRUCTORS: Dr. HARSH SOHAL

MAX. TIME: 1 Hour 30 Min

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. [CO1, CO2, CO3] [8]

- Give a comparison of accuracy with the precision of an instrument? Does higher precision mean higher accuracy? Justify your answer with suitable example(s). (3)
- Two resistors R1 and R2 are connected in series. Individual resistance measurements, using a digital multimeter are given  $R_1=11.7 \text{ ohms}$ ;  $R_2=4.624 \text{ Ohms}$ . Determine the total resistance to the appropriate number of significant figures. (1)
- What is a transducer? What are the basic requirements of a transducer? [2]
- How is Sensor different from an actuator? [1]
- Give a comparison of Active and Passive Transducers [1]

Q2.[CO3] [10]

- You are provided with an RTD, a thermistor, a radiation pyrometer. You are asked to measure the temperature of a furnace (Temperature of the order of 2000 degree Celcius). Which of the above will be the best choice? Answer the question while discussing pros and cons of each of the given devices w.r.t. their characteristics. [4]
- Explain the working of a Pressure sensor using the principle of a parallel plate capacitor. What are the advantages and disadvantages of capacitive transducers? [4]
- Which type of sensor is used in smart phone screen? (Answer the question based on working principle of the sensor used) [1]
- Piezoelectric crystals produce an e.m.f (choose the correct answer)[1]
  - when external mechanical force is applied
  - when external magnetic field is applied
  - when radiant energy stimulates the crystal
  - when the junction of two such crystals is heated

Q3. [CO4] [7]

(a) Describe the general architecture of a smart sensor with various components using a block diagram. What are the advantages and disadvantages of smart sensors over traditional sensors? [3]

(b) What is calibration? Describe soft calibration with reference to smart instrumentation systems? Can we reduce Random Errors using calibration? [4]

12 Examinations December 2022