

M. Sc (Instrumentation) 1st yr 1st Semester Examination- 2023.

Sensors, Transducers and Measurements (MI-103)

Full Marks: 80

Time-Four Hours

(Use separate answer sheet for Part-I and Part-II)

Part-I (40 Marks)

Answer any four questions

1. Discuss Seebeck effect, Peltier effect and Thomson effect. What are the four common types of thermocouples used and range of temperature measurement?

6+4 = 10

2. What are sensor, actuator and transducer? What are the general classifications of transducer?

4+6 = 10

3. What are the common humidity sensors used? Describe in details the psychrometer and basic principles associated with the above measurement.

4+6=10

4. Describe Bourdon gauge and Diphragm gauge. Is a Bourdon gauge a sensor or an actuator or a transducer ?

6+4 =10

5. What are common light sensors? What are LDR, LED and Photodiode? 4+6=10

6. Describe a typical photomultiplier tube (PMT). Name some common coating materials used for obtaining secondary electron emission in PMT.

6+4=10

7. Discuss in details of LVDT in displacement sensor applications.

5+5=10

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M.Sc (INSTRUMENTATION SCIENCE) 1st YEAR 1st SEM. EXAM- 2023

SUBJECT: Sensor, Transducer and Measurements (MI 103)

TIME: 3 HOURS

FULL MARKS: 80

INSTRUCTIONS

The answer scripts must be written in your own hand writing in English language only. Each part of the question is to be written in separate answer script.

Part-II

- Answer question No. 1 and any three questions from the rest. 4 x 10 = 40
1. Answer all questions 1x10 = 10
- (i) What are random errors in any measurement?
- (ii) Define dynamic error in any measurement
- (iii) What is the need for period measurements?
- (iv) What are the flowmeters where the output is frequency varying with flow velocity?
- (v) What is the purpose of time base circuit in a CRO?
- (vi) Explain the role of shunt resistor connect across PMMC movement.
- (vii) Draw Functional Elements of an Instrumentation System.
- (viii) What is band width of an oscilloscope ?
- (ix) Define Loading effect in voltmeter.
- (x) How pulse signals can be observed on an analog scope.
2. How do you measure the unknown inductance using Anderson Bridge. Draw a suitable AC bridge used for measurement of frequency. 6+4 = 10
3. Name different types of flowmeters, frequently used in industry. Compare the advantages and disadvantages of an orifice meter and a venturimeter. Can a rotameter be used in a horizontal pipe line? If not, explain why? 2+5+3 = 10
4. What is meant by dynamic Characteristics of measurement system? Define the following for a measurement system. 2+8 = 10
- (i) Arithmetic mean
- (ii) Deviation
- (iii) Standard deviation
- (iv) Variance 10
5. Sketch labeled equivalent circuit diagram of practical ammeter and voltmeter.. "Digital meters are more advantageous than analog meter." Justify the statement (any four points) 5+5=10
6. Explain the block diagram of a Digital frequency meter. Sketch Block diagram of function generator and state function of each block. 5+5 = 10
7. Write short notes on the following;
- a. Digital Display system b. Probes of an oscilloscope 5+5 = 10