BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Tech.(RA)-2024
Course Name – Measurement and Sensor for Robotics
Course Code - MEC20106
(Semester II)

Full Marks : 60   **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question)   1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Using a voltmeter measured value is 24.3V, while its true value is 24V. The relative error of measurement is

a) 1.25 percent   b) 1.2 percent
c) 1.3   d) 1.4

(ii) The possible phases for linearizing the circuits at the input signal conditioning stage of data logger is

a) At the analog phase before conversion   b) At the conversion phase
c) After the digital phase after the conversion   d) All of the above.

(iii) Analyze from the following that can be cause for non-zero output when zero input

a) Bias   b) Slew
c) Offset   d) Offset or bias

(iv) Ratio of net amount of heat received and stored in the body for certain time interval is known as _____

a) Temperature   b) Thermal coefficient
c) Thermal storage capacity   d) None of the mentioned

(v) The correct relation between pressure and displacement in flapper nozzle system is

a) Direct proportionality   b) Inverse proportionality
c) Equal   d) None of the mentioned

(vi) Identify device can be used for measuring relative angular displacement between two systems

a) Tachometer   b) Synchro

c) Speedo meter

d) None of the mentioned

(vii) Indicate the correct statement for synchro is

a) Transformer type displacement transducer

b) Inductive type displacement transducer

c) Capacitive type displacement transducer

d) Resistive type displacement transducer

(viii) Identify the device is used for measuring relative humidity

a) Capacitive pressure transducer

b) Hygrometer

c) Capacitive strain transducer

d) Capacitive moisture transducer

(ix) The false statement regarding DAQ (Data acquisition) systems is

a) It can measure physical phenomenon which can be sampled

b) Signal conditioning can be done

c) DAQ system can generate its own physical sample sets

d) Analog to digital conversion can be done

(x) Determine the following is correct for load cell

a) Force to electrical energy conversion

b) Electrical energy to force conversion

c) Force to force conversion

d) None of the mentioned

(xi) Specific volume of all substances depends on _____

a) Temperature only

b) Pressure only

c) Both temperature and pressure

d) Temperature and pressure for some

(xii) Choose the following is not a configuration of a smart sensor?

a) Transducer

b) Network interface

c) Processor

d) None of the mentioned

(xiii) Which of the following error is caused by poor calibration of the instrument?

a) Random error

b) Gross error

c) Systematic error

d) Precision error

(xiv) MEM stands for _____

a) Macro electro magnetism

b) Macro electro mechanism

c) Micro electro mechanism

d) Micro electro magnetism

(xv) Identify from the following represents the inverse transducer of a microphone

a) Micro speaker

b) Pressure transducer

c) Bourden element

d) All of the mentioned

Group-B
(Short Answer Type Questions)   3 x 5=15

2. Explain the working principle of the photovoltaic cell.   (3)

3. Illustrate the requirements of a diaphragm .   (3)

4. Describe the Piezoelectric material.   (3)

5. Define repeatability and reproducibility.   (3)

6. Differentiate between Primary and Secondary transducers.   (3)

OR

Differentiate between Transducers and Inverse Transducers. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Describe the operation of the disappearing filament type total radiation pyrometer. (5)
8. Illustrate the advantages and disadvantages of the semiconductor type strain gauge. (5)
9. Explain with neat diagram the ferromagnetic plunger type inductive sensor. (5)
10. Explain about the measurement system with an practical example. (5)

11. Explain the necessity of charge amplifier in the piezoelectric transducer. (5)
12. Explain Vapour filled thermometers. (5)

OR

Explain parallel plate capacitive transducers. (5)

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