

IPCD

PROBABLE QUESTION

ANSWERS

MOD 1 & 2

1. What is the main objective of process control?

- a) to control physical parameters
- b) to control mechanical parameters
- c) to control optical parameters
- d) to control electrical parameters



[View Answer](#)

Answer: a

Explanation: A process control is mainly used in order to control the physical parameters including temperature, pressure, flow rate, force, etc.

2. What is a process control system?

- a) system to keep the parameters at zero value
- b) system to maintain the parameters constant
- c) system to keep the parameters at highest value
- d) system to check the voltage

 [View Answer](#)

Answer: b

Explanation: A process control system is generally used to maintain the parameters such as temperature, pressure, flow rate, force, etc constant in a system.

3. Physical parameters change due to \_\_\_\_\_
- a) voltage
  - b) current
  - c) internal and external disturbances
  - d) power

 [View Answer](#)

Answer: c

Explanation: The physical parameters such as temperature, pressure, flow rate, force, etc in a process control system are affected due to both internal and external disturbances. As a result, constant corrective action is required to keep them at a constant value.

5. For proper feedback in a process control element, it is required to \_\_\_\_\_

- a) measure P
- b) measure set point
- c) measure error
- d) measure comparator

 [View Answer](#)

Answer: a

Explanation: In a process control element, proper feedback is obtained by measuring the parameter P. Electrical input is required in most of the process controllers as they are electronic in nature.

4. A process control system consists of \_\_\_\_\_

- a) 10 elements
- b) 6 elements
- c) 2 elements
- d) 4 elements

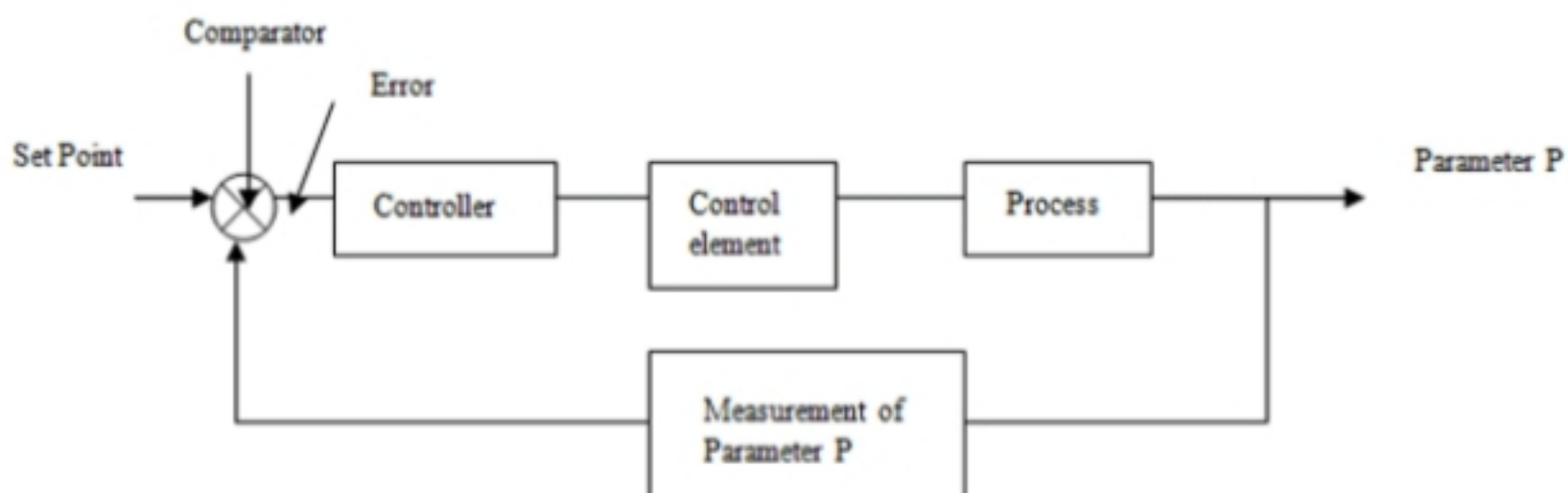
[^ View Answer](#)

Answer: d

Explanation: A typical process control system consists of 4 elements. They are as follows:

- Process
- Measurement
- Controller
- Control element

The figure shown below illustrates the process control loop.



6. Feedback path element measure only input parameters.

a) True

b) False

 [View Answer](#)

Answer: b

Explanation: In a process control system, feedback path measures the output parameters. It also produces a proportional analog signal in electric form.

7. A transducer converts \_\_\_\_\_

- a) mechanical quantity to electrical form
- b) electrical quantity to physical form
- c) physical quantity to electrical form
- d) chemical quantity to physical form

 [View Answer](#)

Answer: c

Explanation: A transducer basically converts a physical quantity such as temperature, pressure, force, flow rate, etc into electrical form such as voltage and current.



8. An electrical transducer consists of \_\_\_\_\_

- a) 4 parts
- b) 6 parts
- c) 8 parts
- d) 2 parts

 [View Answer](#)


Answer: d

Explanation: An electrical transducer basically consists of 2 parts. The first is known as the sensing element while the second is known as the transduction element. The first element is also known as a sensor.

9. A transducer is part of a large circuit and produces the required output.

a) True

b) False


 [View Answer](#)

Answer: a

Explanation: A transducer basically converts a physical quantity such as temperature, pressure, force, flow rate, etc into an electrical forms such as voltage and current. A transducer is part of a large circuit. It produces the required output by operating along with several other elements.

1. What led to the development of PC based transducers?

- a) low cost
- b) medium cost
- c) high cost
- d) zero cost

 [View Answer](#)

Answer: a

Explanation: Easy availability, low cost and large scale usage of Personal Computers have led to the development of interfaces between PC and the transducer outputs.

2. ADD ON card is used for \_\_\_\_\_

- a) to reduce noise
- b) communication
- c) to boost the magnitude
- d) to measure voltage

 [View Answer](#)

Answer: b

Explanation: PC based data acquisition system makes use of an ADD ON card for the purpose of communication and analysis of multiple measurement data.

3. PC based data acquisition system displays system parameters \_\_\_\_\_
- a) once in a while
  - b) intermittently
  - c) continuously
  - d) only at specific intervals

 [View Answer](#)

Answer: c

Explanation: A PC based data acquisition system displays the parameters of a system in a continuous manner. As a result all the parameters are monitored instantaneously and conveniently.

4. What are MIMIC displays?

- a) man-material interface
- b) man-made interface
- c) man-machine interface
- d) man-machine interface

 [View Answer](#)


Answer: d

Explanation: In a PC based data acquisition system, MIMIC displays are used for displaying the data measured at any part of a system on the screen. MIMIC stands for man-machine interface.

5. System parameters are distinguished by physical attributes.

a) True

b) False

 [View Answer](#)

Answer: a

Explanation: In a PC based data acquisition system, physical attributes such as blink, underline, inverse video, etc are used to display the system parameters.

6. Personal computer does not contain additional hardware in a PC based data acquisition system.

a) True

b) False

 [View Answer](#)

Answer: b

Explanation: In a PC based data acquisition system, the personal computer consists of additional hardware for data analysis and data acquisition. These are integrated through the means of software.



7. Data analysis hardware is used for \_\_\_\_\_
- a) making the process independent
  - b) slowing the process
  - c) fastening the process
  - d) making the process constant


 [View Answer](#)

Answer: c

Explanation: In a PC based data acquisition system, data analysis software is used for the purpose of mainly fastening the computations and analysis in case of DSP applications.

8. Input signal range in a PC based data acquisition system is \_\_\_\_\_

- a) 0.10 mV to 1 V
- b) 1 mV to 100 V
- c) 5 mV to 5 V
- d) 10 mV to 10 V

 [View Answer](#)

Answer: d

Explanation: In a PC based data acquisition system, the input signal in the range of 10 mV to 10 V is amplified by means of a digital programmable gain amplifier to a particular level.

9. Amplified input signal is digitised through

---

- a) A/D converters
- b) D/A converters
- c) Rectifiers
- d) Sigma delta modulators

 [View Answer](#)

Answer: a

Explanation: In a PC based data acquisition system, the amplified input signal is converted to digital form by making use of high speed A/D converters. These are interfaced to the PC bus.

**1. When a bare thermocouple is covered by a protective sheath, the response becomes**

- ☐ (A) Faster and oscillatory
- ☐ (B) Faster and non-oscillatory
- ☐ (C) Slower and oscillatory
- ☐ (D) Slower and non-oscillatory

**Correct Answer**

Answer: Option D

**2. Which of the following thermocouples is incapable of measuring sub-zero (i.e.,  $< 0^{\circ}\text{C}$ ) temperature?**

- ☐ (A) Chromel-alumel
- ☐ (B) Iron-constantan
- ☐ (C) Platinum-platinum + rhodium
- ☐ (D) Copper-constantan

**Correct Answer**

Answer: Option C


3. \_\_\_\_\_ temperature scale assigns  $0^{\circ}$  to the 'ice point' and  $80^{\circ}$  to the 'steam point'.

- ☐ (A) Celsius
- ☐ (B) Rankine
- ☐ (C) Reaumur
- ☐ (D) Fahrenheit

**Correct Answer**

Answer: Option C

1. Transducer is used to convert a \_\_\_\_\_
- a) physical quantity into an electrical signal
  - b) electrical signal into a physical quantity
  - c) physical quantity into a mechanical quantity
  - d) physical quantity into a chemical quantity

 [View Answer](#)

Answer: a

Explanation: Transducer forms one of the most important components of an analog data acquisition system. It converts a physical quantity into an electrical signal. Strain gauge, thermocouples, piezoelectric devices are the most widely used transducers.

**12. Thermocouple is suitable for measuring**

- ☐ (A) Liquid temperatures only
- ☐ (B) Very high temperatures only
- ☐ (C) Very low temperatures only
- ☐ (D) Both high and low temperatures

**Correct Answer**

Answer: Option D



2. Transducer produces a \_\_\_\_\_

- a) proportional current
- b) proportional voltage
- c) proportional resistance
- d) proportional power

 [View Answer](#)

Answer: b

Explanation: A transducer generates a voltage proportional to the physical quantity that is being measured. The voltage output from a transducer forms the input to a data

3. Sensors produce frequency which is counted by \_\_\_\_\_

- a) a chemical counter
- b) a mechanical counter
- c) an electronic counter
- d) a basic counter

 [View Answer](#)

Answer: c

Explanation: Transducers consist of special sensors used to produce frequency that can be counted by means of an electronic counter. This frequency forms an integral part of the frequency measured.

4. Signal conditioner is used for \_\_\_\_\_
- a) attenuating the voltage
  - b) maintaining a constant voltage
  - c) keeping the voltage zero
  - d) boosting the voltage

 [View Answer](#)

Answer: d

Explanation: Signal conditioner is an important part of an analog data acquisition system. A signal conditioner converts the output voltage to the desired form which is accepted by the next stage.

1. What is the slew rate of an ideal operational amplifier?

- a) 0
- b) 1
- c) 100
- d) Infinite

 [View Answer](#)

Answer: d

Explanation: The slew rate of an ideal operational amplifier is infinite. Slew rate of an operational amplifier is defined as the rate of change of output voltage with respect to time (i.e)  $dv/dt$ . An ideal operational amplifier

2. What is the open loop gain of an ideal operational amplifier?

- a) 0
- b) 1
- c) Infinite
- d) -1

 [View Answer](#)

Answer: c

Explanation: The open loop gain of an ideal operational amplifier is infinite. Open loop gain of an operational amplifier is defined as output voltage divide by input voltage ( $V_{out}/V_{in}$ ). In ideal case the operational amplifier produces infinite output voltage when very low input voltage is applied.

3. What is the phase difference between input signal and output signal when input is provided to the inverting terminal of the operational amplifier?

- a) 0 degree
- b) 90 degree
- c) 180 degree
- d) 45 degree

 [View Answer](#)

Answer: c

Explanation: There 180 degree phase difference between input signal and output signal when input is provided to the inverting terminal of the operational amplifier. When input is provided to the negative terminal it adds 180 degree phase shift to the input signal and inverts the input signal, that is why the terminal is also called as inverting terminal.

4. What is the slew rate of an operational amplifier whose output voltage increases by 9 volt in 18 micro second?

- a) 0.5 Volt/microsecond
- b) 5 Volt/microsecond
- c) 50 Volt/second
- d) 2 Volt/microsecond

 [View Answer](#)

Answer: a

Explanation: Given:

Change in voltage(dv)=9 Volt


Change in time(dt)= 18 micro second

Slew rate= $dv/dt=9V/18$  microsecond=0.5  
volt/microsecond

5. A practical operational amplifier has infinite bandwidth.

a) True

b) False

 [View Answer](#)


Answer: b

Explanation: A practical operational amplifier does not have infinite bandwidth. It is so because at higher frequency signals the efficiency of amplification starts to decrease. The practical operational amplifier cannot amplify signals with very high frequency. Ideal operational amplifiers have infinite bandwidth.



1. \_\_\_\_\_ sensors are utilised to measure variables such as point, velocity, acceleration, force, press, levels and flow.

- a) Humidity
- b) Optical
- c) Thermal
- d) Mechanical

 [View Answer](#)

Answer: d

Explanation: Mechanical sensor is an object whose function is to detect changes in its environment, and then provide a corresponding output. It's a type of transducer; sensors might provide various types of output, but typically utilize electrical or optical signals.

2. \_\_\_\_\_ sensors rely on a change of capacitance, resistance, inductance, or reluctance.

- a) Point
- b) Humidity
- c) Proximity
- d) Thermal

 [View Answer](#)

Answer: a

Explanation: A point sensor is any device that permits point measurement. It could either be an absolute point sensor or a relative one (displacement sensor). Point sensors could be linear, angular, or multi-axis.

3. A potentiometric displacement sensor utilizes a wire of high resistance with a wiper in electrical contact with the wire.

a) True

b) False

 [View Answer](#)

Answer: a

Explanation: As the object moves across the wire, the resistance of the circuit changes. By measuring the resistance, the point of the object along the wire is known.

4. Variable inductance is achieved by the utilization of \_\_\_\_\_ core in the shape of a rod which is wrapped by a hollow coil of wire.

- a) Ferrimagnetic
- b) Ferromagnetic
- c) Paramagnetic
- d) Diamagnetic

 [View Answer](#)

Answer: b

Explanation: As the ferromagnetic core enters the coil the inductance of the coil is replaced. With reluctance sensors, the magnetic flux coupling b/w 2 or more coils is varied by a ferromagnetic core. Inductance is a calculation that relates electrical flux to the current.



5. \_\_\_\_\_ sensors is a type of transformer and are the basis of the prevalent L.V.D.T . The signal is easily conditioned to give out a D.C. voltage that is linearly proportional to position over part of the range of motion of the core.

- a) Speed
- b) Temperature
- c) TIR
- d) Reluctance

 [View Answer](#)

Answer: d

Explanation: It's a type of sensor that are the basis of the prevalent L.V.D.T. linear variable differential transformer. The sensitivity could

1-Which of the following is not covered under Mechanical energy domain?

- (A) Distance
- (B) Latent heat
- (C) Force
- (D) Size

2-Which of the following form the basis of Electrical domain?

- (A) Current
- (B) Resistance
- (C) Inductance
- (D) All of the above

**3-The sensors are classified on the basis of**

- (A) Functions
- (B) Performance
- (C) Output
- (D) All of the above

**4-The following is not a static performance parameter to be looked into before selecting a parameter.**

- (A) Range
- (B) Deflection
- (C) Stability
- (D) Error

5-The following main dynamic characteristic(s) is usually considered in Mechatronics application of sensors.

- (A) Response time
- (B) Rise time
- (C) Time constant
- (D) All of the above

6-The ability to give same output reading when same input value is applied repeatedly is known as

- (A) Stability
- (B) Repeatability
- (C) Accuracy



Sensitivity



7-It is the ability of the sensor to indicate the same output over a period of time for a constant input.

- (A) Stability
- (B) Resolution
- (C) Error
- (D) Impedance

8-It is the time required to come to an output value within the specified error level.

- (A) Response time
- (B) Rise time

✓ Settling time

9-Following is the coded output.

- (A) Modulation of amplitude
- (B) Modulation of frequency
- (C) Modulation of pulse width
- (D) All of the above

10-Following is not an example of transducer.

- (A) Analogue voltmeter
- (B) Thermocouple



Photo electric cell

**11-The following is (are) type(s) of Hall Effect sensors.**

- (A) Linear Hall Effect sensor
- (B) Threshold Hall Effect sensor
- (C) Both (A) and (B)
- (D) None of the above

**12-Following is (are) true for Hall Effect sensors.**

- (A) They can operate as switches of high frequency
- (B) They cost less than electromechanical switches

13-A piezo-electrical crystal generates voltage when subjected to \_\_\_\_ force.

(A) Electrical

(B) Mechanical

(C) Gravity

(D) All of the above

14-Hall Effect sensors are used in

(A) Flow meter

(B) Fuel level indicator

(C) Both (A) and (B)

(D) None of the above

16-Following is (are) the type(s) of Light sensor(s)

(A) Photo sensor

(B) Photo transistors

(C) Photo conductors

(D) All of the above

17-Following type of sensors are used to generate information in object grasping and obstacle avoidance.

- (A) Hall Effect sensor
- (B) Proximity sensor
- (C) Light sensor
- (D) Optical sensors

18-Inductive proximity sensors can be effective only when the objects are of \_\_\_\_\_ materials.

- (A) Ferro magnetic
- (B) Diamagnetic
- (C) Paramagnetic

✓ All of the above

**19-Following acts as detector in Optical sensor**

(A) Light emitting diode

(B) Photo diode

(C) Transistor

(D) All of the above



15-'Any radiation of appropriate wavelength fall on the depletion layer of p-n junction develops a potential difference between the junction' is working principle of

(A) Hall Effect sensor

(B) Proximity sensor

(C) Light sensor

(D) All of the above

19-Following acts as detector in Optical sensor

(A) Light emitting diode

(B) Photo diode

(C) Transistor

(D) All of the above

**ANSWERS:**

1-(B), 2-(D), 3-(D), 4-(B), 5-(D), 6-(B), 7-(A), 8-(C),  
9-(D), 10-(A), 11-(C), 12-(D), 13-(B), 14-(C), 15-  
(C), 16-(D), 17-(B), 18-(A), 19-(B)