

March 2022

**MEASUREMENT & CONTROL**

Time Allowed: 2 Hours

Full Marks: 35

Answer the following questions from Group A, B &amp; C as directed.

**GROUP-A**

1. Choose the correct answer from the given alternatives (any five): 1x5
- i. LVDT is used to measure-
    - a) force
    - b) torque
    - c) flow rate
    - d) displacement
  - ii. In analog instruments, the signals involved are-
    - a) stepped signal
    - b) continuous signals
    - c) piecewise signals
    - d) none of these
  - iii. The working principle of thermocouple is based on-
    - a) Compton effect
    - b) photo electric effect
    - c) Meissner's effect
    - d) Seebeck effect
  - iv. A measuring system consists of-
    - a) Sensors
    - b) Variable conversion elements
    - c) Signal processing elements
    - d) All of these
  - v. An ammeter is inserted in \_\_\_\_\_.
    - a) Series in a circuit and current to be measured flows through it
    - b) Series in a circuit and part of the current to be measured flows through it
    - c) Parallel in a circuit and current to be measured flows through it
    - d) Parallel in a circuit and only part of the current to be measured flows through it.
  - vi. The deflecting torque in an instrument may be produced-
    - a) Magnetically
    - b) Electrostatically
    - c) Thermally
    - d) Any of the above
  - vii. Positive displacement flow meters are \_\_\_\_\_ flow meters.
    - a) Variable area flow
    - b) Differential pressure flow
    - c) Quantity flow
    - d) None of these
  - viii. By which of the following dynamometers are performance characteristics of pumps and compressors determined?
    - a) Driving dynamometer
    - b) Absorption dynamometer
    - c) Transmission dynamometer
    - d) None of these

2. Fill in the blanks (any five):

1x5

- i. Eddy current dynamometer is a \_\_\_\_\_ type of dynamometer
- ii. Stroboscope is a device used for measuring \_\_\_\_\_.
- iii. Transducers are use to \_\_\_\_\_.
- iv. Full form of RVDT is \_\_\_\_\_.
- v. LVDT works on the principle of Faraday's law of \_\_\_\_\_.
- vi. The degree of closeness of measured values of a quantity to actual value of the quantity is called \_\_\_\_\_ of the instrument.
- vii. Feedback signal is an essential part of a \_\_\_\_\_ loop system.
- viii. The full form of ABS used in modern vehicles is \_\_\_\_\_.

3. Answer the following questions in one or two sentences (any five):

1x5

- i. State the types of dynamometers.
- ii. What is relative humidity in terms of pressures?
- iii. Name the basic components of a closed loop system.
- iv. What is the function of a transducer?
- v. State the types of flow measuring devices.
- vi. Give one example each for open loop control system and closed loop control system.
- vii. What is the relationship between 1 Atmospheric pressure and Psi (pounds per square inch)?
- viii. State the relationship between 1 Horse power and Watt.

#### GROUP-B

4. Answer the following questions (any four):

2.5x4

- ~~i.~~ Draw a block diagram showing the basic components of any measuring instrument /system.
- ~~ii.~~ Draw the block diagram of a typical closed loop system.
- ~~iii.~~ State two differences between closed loop system and open loop system.
- iv. Draw a strain rosette with three strain gauges properly arranged.
- ~~v.~~ Draw the basic construction of a LVDT.
- vi. Write down Faraday's Law of electromagnetic induction in your own words very briefly.
- vii. Name four devices for measuring fluid flow.
- viii. What do you mean by specific humidity of air?

#### GROUP-C

5. Answer the following question (any one):

- i. Classify the measuring instruments in all possible ways, giving example for each classification. 10
- ii. What are open loop system and closed loop systems? Explain with block diagrams. Mention four differences of open loop system and closed loop system. <https://www.wbscteonline.com> 10
- iii. Explain the working principle of radiation pyrometer. 10
- iv. Create a system with two small solid balls, a hollow cylindrical sleeve that can slide past a shaft and with other necessary linkages, to be used to measure the speed of a rotating shaft. Explain the working of your instrument including its calibration method. 10
- v. What is a servomotor? Explain, if required, with a block diagram. 10
- vi. Think of a system that you can design at your home to automatically detect the liquid level of your house's overhead tank and automatically switch on the pump to re-fill the reservoir only upto its desired level. How would you do that? Explain. 10