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GIET UNIVERSITY, GUNUPUR – 765022
 B. Tech (Fifth Semester – Regular) Examinations, December – 2022
BOEBT5060 / BOEEI5053 - Process Instrumentation
 (Biotech/ Chemical Engineering)

Time: 3 hrs

Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)

(1 x 10 = 10 Marks)

- Q.1. Answer ALL questions** [CO#] [PO#]
- a. In _____ measurement methods, the unknown quantity (measurand) is measured directly instead of comparing it with a standard CO1 PO1
- (i) Direct (ii) Indirect
 (iii) Both (i) and (ii) (iv) None of these
- b. _____ error occurs due to hysteresis or due to friction CO1 PO1
- (i) Gross (ii) Random
 (iii) Instrumental (iv) All of the above
- c. The primary conversion takes place in float type level indicator is CO3 PO1
- (i) Level to pressure (ii) Voltage to level
 (iii) Level to displacement (iv) Level to force
- d. In closed container type level measuring system, pressure at top of container is due to _____ CO1 PO1
- (i) Vacuum pressure (ii) Vapor pressure
 (iii) Liquid pressure (iv) Atmospheric pressure
- e. In which of the following categories be thin plate diaphragm included? CO2 PO3
- (i) Primary transducer (ii) Secondary transducer
 (iii) Voltage measuring devices (iv) Spring balance systems
- f. The devices used for flow obstruction is/are CO1 PO2
- (i) Orifice plate (ii) Venturi tube
 (iii) Flow nozzle and Dall flow tube (iv) All of these
- g. What are the main criteria on which mass spectrometer used for? CO1 PO1
- (i) Composition in sample (ii) Relative mass of atoms
 (iii) Concentration of elements in the sample (iv) Properties of sample
- h. The cold junction in a thermoelectric pyrometer is maintained at _____ CO4 PO1
- (i) 12 F (ii) 32 F
 (iii) 55 F (iv) 80 F
- i. Bimetallic strips are employed in _____ thermometers. CO1 PO3
- (i) Vapor-pressure (ii) Liquid-expansion
 (iii) Metal-expansion (iv) Resistance
- j. In Atomic Absorption Spectroscopy, which of the following is the generally used as a radiation source? CO2 PO1
- (i) Tungsten lamp (ii) Xenon mercury arc lamp
 (iii) Hydrogen or deuterium discharge lamp (iv) Hollow cathode lamp

PART – B: (Short Answer Questions)**(2 x 10 = 20 Marks)**Q.2. Answer ALL questions

| | [CO#] | [PO#] |
|--|-------|-------|
| a. What is the importance of flow measurement in process control? | CO1 | PO1 |
| b. What is a Reynold's number? On what factor does it depend? | CO3 | PO1 |
| c. Write a brief note on bimetallic thermometers. | CO1 | PO4 |
| d. How the direct method of liquid level measurement could be different from an indirect method of liquid level measurement? | CO2 | PO1 |
| e. Define following: (i) Dead Time (ii) Vena Contracta (iii) Rangeability (iv) Hysteresis | CO1 | PO4 |
| f. What do you mean by pressure switch? State its uses. | CO4 | PO2 |
| g. What is meant by inferential flow meters? | CO1 | PO2 |
| h. What do you mean by force balance pressure transducer? | CO3 | PO1 |
| i. Write any two advantages of mass spectroscopy. | CO1 | PO1 |
| j. Define the terms: Repeatability and Reproducibility. | CO2 | PO2 |

PART – C: (Long Answer Questions)**(10 x 4 = 40 Marks)**Answer ALL questions

| | Marks | [CO#] | [PO#] |
|---|-------|-------|-------|
| 3. a. Describe the construction and working of the thermocouple with a neat sketch. Name any two types of thermocouples. | 3+2 | CO2 | PO1 |
| b. What is a capacitance-type level gauge? Explain its works with the necessary diagram. | 2+3 | CO4 | PO1 |
| (OR) | | | |
| c. Draw the block diagram showing the functional elements of an instrumentation system and explain different functional elements. | 5 | CO1 | PO1 |
| d. Describe the working principle of the radiation level indicator with a diagram. | 5 | CO2 | PO3 |
| 4. a. What do you mean by performance characteristics? Explain various attributes of an instrument. | 2+3 | CO2 | PO1 |
| b. Explain the working of thermal flowmeters used for measuring the unsteady flow of gases. | 5 | CO4 | PO2 |
| (OR) | | | |
| c. With the help of a diagram, explain the construction and working of the McLeod gauge. | 2+3 | CO1 | PO2 |
| d. What are the different types of static errors? Explain each of them. | 5 | CO2 | PO1 |
| 5. a. Differentiate between absorption spectroscopy and emission spectroscopy. | 5 | CO1 | PO2 |
| b. Write the working principle of the Rotameter with its advantages and disadvantages. | 3+2 | CO2 | PO1 |
| (OR) | | | |
| c. Draw a schematic diagram and write the basic principle of level measurement using; (i) Hook type level indicator (ii) Float type level indicator | 3+2 | CO3 | PO3 |
| d. Describe the construction and working of Radiation Pyrometer with its sources of errors. | 2+3 | CO2 | PO4 |
| 6. a. Write short notes on Emission Spectroscopy. | 5 | CO1 | PO1 |
| b. Briefly describe Air Purge System and Liquid Purge System. | 5 | CO1 | PO1 |
| (OR) | | | |
| c. Explain with a neat sketch, the construction and working of strain-gauge pressure transducer, with its advantages and disadvantages. | 3+2 | CO2 | PO2 |
| d. Write the principles of working of an optical pyrometer with a neat sketch. | 5 | CO2 | PO1 |

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