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Total Number of Pages : 02

B.Tech
PEI5I101

5th Semester Regular / Back Examination 2018-19

INSTRUMENT DEVICES & SYSTEM - II

BRANCH : AEIE, EIE, IEE

Time : 3 Hours

Max Marks : 100

Q.CODE : E302

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Short Answer Type Questions (Answer All-10) (2 x 10)

- Differentiate Absolute pressure and Gauge pressure with proper example.
- Define Reynolds number. What is its significance?
- Differentiate full immersion type and partial immersion type liquid in glass thermometers.
- Why the ratios of pressures at ice and steam points (R) of ideal gas for different volumes are not equal?
- Name the commonly used sources for γ -rays (Gamma- rays) for level measurement.
- What do you mean by zero elevation and zero suppression in level measurement?
- The seismic mass of a spring mass accelerometer is 50 g and the spring constant is 5000 N/m. The amplitude of the mass displacement is ± 2 cm. Calculate the maximum measurable acceleration in 'g'.
- Why an object begins to glow as its temperature increases?
- Draw the ladder diagram of XNOR gate.
- Differentiate LED and photodiode.

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any EIGHT out of TWELVE) (6 x 8)

- Explain the construction and principle of operation of at least two ionization gauges in detail.
- Describe the construction and working of rotameters. How is the compensation for density variation obtained?
- A Venturi tube of throat diameter 6 cm is placed in a water pipe of diameter 10 cm to measure the volumetric flow of rate which is found to be $0.08 \text{ m}^3/\text{sec}$. If the density and viscosity of water are 10^3 kg/m^3 and 10^{-3} Pa.s respectively, determine
 - Reynolds number for these conditions
 - Upstream-to-throat differential pressure developed (Given discharge coefficient=0.99)
- Describe the Filled system Thermometers in detail.
- Derive the expression for error in level measurement (using floats) due to change in density of the liquid.
- What do you mean by reed switch? Give one example how it is used to indicate the level of fluids.
- Define the term pH of a solution. What is buffer solution? Explain the construction and working principle of calomel electrode for measurement of pH of unknown solution.
- Explain briefly how conductivity is being measured?

- i) A photovoltaic cell is to be used with radiation of intensity from 5 to 12 mW/cm². Measurements show that its unloaded output voltage ranges from 0.22 V to 0.41 V over this intensity while it delivers current from 0.5 mA to 1.7 mA into a 100-Ω load.
- Find the range of short circuit current
 - Develop signal conditioning to provide a linear voltage from 0.5 V to 1.2 V as the intensity varies from 5 to 12 mW/cm².
- j) Explain the principles of thermal detectors used in optical measurement systems.
- k) Write short note on photo conductive cell.
- l) Explain basic structure of PLCs briefly.

Part-III

Long Answer Type Questions (Answer Any TWO out of FOUR)

- Q3** Describe the principle of operation of different mechanical vacuum gauges briefly. Derive the expression for McLeod gauge showing the relation between pressure and height. Describe the process of making the relation linear. **(16)**
- Q4** Derive the transfer function for piezoelectric system for measurement of acceleration. What are the disadvantages of this system? How to overcome these disadvantages? **(16)**
- Q5** Write down the laws of radiation having importance in radiation pyrometry. What do you mean by radiation pyrometer? Describe broadband and narrowband pyrometers in detail with their applications. **(16)**
- Q6** Construct a narrative statement for the event sequences and draw ladder diagram for the bottle filling process given in the figure below assuming 1 minute pre-fill is required for initialization. **(16)**

