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Total Number of Pages: 2

**B.TECH**  
**PECH5304**

**5<sup>th</sup> Semester Regular / Back Examination 2015-16**  
**PROCESS INSTRUMENTATION**  
**BRANCH: BIOTECH**  
**Time: 3 Hours**  
**Max Marks: 70**  
**Q.CODE: T669**

**Answer Question No.1 which is compulsory and any five from the rest.**  
**The figures in the right hand margin indicate marks.**

- Q1** Answer the following questions: **(2 x 10)**
- a) How will the pressure difference measured with a venturi tube change if the volume rate of flow is doubled?
  - b) What is the temperature on the kelvin scale of  $-30^{\circ}\text{C}$ ?
  - c) What advantage does a bimetallic thermometer has on mercury in glass thermometer?
  - d) What is the gauge pressure in a liquid of density  $1000\text{kg/m}^3$  and depth of  $0.02\text{m}$ ?
  - e) Distinguish between accuracy and precision.
  - f) Under what circumstances would a nickel resistance thermometer be preferred over a platinum resistance thermometer?
  - g) Suggest a flow-meter that could be used to measure the volumetric flow-rate of a liquid with some fine particles.
  - h) The density of Hg at  $0^{\circ}\text{C}$  is  $13.595\text{ kg/m}^3$  what is its density at  $20^{\circ}\text{C}$  if  $\gamma$  (coefficient of cubical expansion) is  $0.000185/^{\circ}\text{C}$
  - i) For what application thermistor is preferred as temperature sensor?
  - j) Suggest an instrument for liquid level measurement for conductive liquid.
- Q2** a) Distinguish the principle of measurement of Absorption and Emission Spectroscopy. **(5)**
- b) Briefly explain principle of measurement of Radiation and Optical pyrometers. **(5)**
- Q3** a) Describe the construction and working of electromagnetic flow-meter in the flow measurements. **(5)**
- b) What are its advantages over other flow-meters? **(5)**
- Q4** What are the devices used in pressure measurement? Explain any one. Explain with a neat sketch the construction and working of resistance thermometer. **(10)**

- Q5 a)** Explain the principles involved in the operation of following flow-meters: **(5)**  
I) Pitot tube ii) Orifice plate iii) Rotameter
- b)** A mercury barometer has the height readings of 760mm of mercury. **(5)**  
What is the atmospheric pressure in pascals? (sp. Gravity of Hg = 13.6, g = 9.81 m/sec<sup>2</sup>)
- Q6 a)** Briefly describe various electrical methods of liquid level measurement. **(5)**  
**b)** Briefly describe the principle and construction of mass flow-meter. **(5)**
- Q7 a)** An open manometer is used for measuring tank pressures. If the **(5)**  
difference in level in the legs of manometer is 2000 mm of mercury when  
the atmospheric pressure is 770 mm of mercury, find total tank pressure  
in kg/cm<sup>3</sup>.
- b)** What are thermocouples? Enumerate the principles and their uses in **(5)**  
industry.
- Q8** Write short notes on any two: **(5 x 2)**  
**a)** Pressure measuring devices  
**b)** Mass Spectroscopy  
**c)** Pyrometer  
**d)** Response of second order instrument with example