Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PECH 5304

Fifth Semester Back Examination – 2014

PROCESS INSTRUMENTATION

BRANCH : BIOTECH

QUESTION CODE : L295

Full Marks – 70

Time : 3 Hours

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

1. Answer the following questions : 2 ×10

   (a) State the advantages and limitations of RTD.

   (b) Determine the displaced volume of the liquid at 20° C when the buoyancy effect on the object is 5000 kg.?

   (c) How will you measure the mass flow rate ?

   (d) Express the pressure 260 mmHg Vacuum in absolute and gauge pressures.

   (e) State the different type's orifice plates and sketch them.

   (f) Lists out the different types of flow measurements.

   (g) Calculate the buoyancy force on an object that displaces 5 m^3 of water at 20^0 C.

   (h) What is emissivity ?

   (i) Explain Reynold's number.

   (j) What will be the gauge pressure and absolute pressure at the depth of 35 m in water tank ? Express them in Kg/cm^2 and mm in Hg.

2. Explain the principle of thermal mass flow meters. Determine the volume flow rate of water through a pipe of 150 mm diameter when measured by (i) an orifice plate of size 75 mm diameter and (ii) Venturi tube of throat size 75 mm diameter. The differential pressure recoded is 250 pa. Assume the density of water is 1000 kg/m^3. 10

P.T.O.

3. What are the different types of electrical pressure transducers ? Explain the working principle of capacitance pressure transducers and potentiometric pressure transducers. 10

4. (a) Determine the height of the liquid column in a closed tank. The hydrostatic pressure is given as 3000 kg/m^2 and the external pressure on liquid in the tank is 450 kg/m^2. Assume density of water is 1000 kg/m^3. 5

   (b) State the working principle of Inferential flow meters. Write the advantages and disadvantages of these flow meters. 5

5. (a) Explain about the location correction for hydrostatic level measurement. 5

   (b) What are the steps involved in calibrating a thermometer ? 5

6. (a) What are the means by which very high pressures can be measured ? Explain any one. 5

   (b) Explain the working principle of well-type manometer and write its advantages. 5

7. (a) Give one practical example of ultrasonic level measurement. 5

   (b) Explain the level measurement by electrical methods. 5

8. Write short notes on any **two** : 5×2

   (a) Mass spectroscopy

   (b) Force-balance pressure gauges

   (c) Float-type level indicator

   (d) Mass flow meters.