**Karunya University**
**(Karunya Institute of Technology and Sciences)**
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1965)

**End Semester Examinations - 2015-16 Even Semester - May 2016**

**14EI3009 Industrial Instrumentation**

**Set A**

**Time : 3 hrs**
**Total Marks: 100**

1. Explain, with neat sketch, the construction and working principle of vacuum pressure measuring devices, with its advantages and disadvantages. (20)

**OR**

2. a. Describe about construction and working principle of manometers and its advantages .(12)

b. what are the errors introduced in manometers. (5)

C . A U tube manometer uses tubes of 10 mm and 30 mm diameter for the two legs. The difference in height of the two fluid columns is 280mm of mercury when subjected to certain pressure. What would have been the difference in height if both legs were of same diameter? (3)

3. a.Explain rotameter type variable area flow meters with its advantages and disadvantages. (12)

b. A venturi tube of throat diameter 50mm is placed in a water pipe of diameter 100mm to measure volumetric flow. The volumetric flow rate through the tube is $80x10^{-3}m^3/s$. water has density of $10^3$ kg/$m^3$ and viscosity of $10^{-3}Ns/m^2$

i. determine Reynolds number.

ii. given that the co-efficient of discharge is 0.98. Determine the upstream and throat differential pressure. (8)

**OR**

4. a. Explain the theory of orifice and venturi type flow meters with necessary diagrams (15)

b. Calculate the flow of water through a 500x150mm horizontal venturimeter, if the mercury manometer connected between inlet and throat of the venture shows a differential pressure of 260 mm of mercury. Assume that specific gravity of mercury is 13.6 and the co-efficient of discharge is 0.98. water has density of $8^3$kg/$m^3$. (5)

5. a. Explain method of measurement of temperature with resistance thermometers. Describe the properties of materials which should be used for resistance thermometers. (12)

b.Describe the salient features of resistance thermometers (3)

c. A platinum thermometer has a resistance of 120Ω at 25$^oC$ .i) find its resistance at 65$^oC$ if the platinum has a resistance temperature co-efficient of 0.00392/$^oC$ . ii) if the thermometer has resistance of 150 Ω, calculate the temperature (5)

**OR**

6. a. Explain the liquid filled thermometers. What are the properties of a liquid suitable for liquid filled thermometers? Give the characteristics of some commonly used liquids (15)

b. Calculate the temperature sensitivity of a thermister at 120$^oC$.its sensitivity at 100$^oC$ is 1.3Ωm.express the result in Ωm/$^o$ K .Take ß=4120k at 100$^oC$ (5)

7. a). Describe with neat sketch two types of non contact type flow meters (15)

b) calculate the stagnation pressure if an airgraft is travelling at a speed of 900km/hr relative to air. The ambient conditions are: atmospheric pressure=92.5kN/$m^2$ and temperature =-5$^oc$ . The gas constant is 287 J/kg ( 5)

**OR**

8. a . with neat sketch explain the operating principle of thermal-conductivity gauge. (12)

b. two bellows are used to measure absolute pressure each of natural length 60mm, effective area=1600mm$^2$, and stiffness=0.5N/mm.bellows A is evacuated and contains a spring of stiffness 3 N/mm. Find the required natural length of spring if the bellows are to equally compressed to a length 40mm when a pressure of 100kN/m$^2$ absolute is applied to B. Also find the displacement of the output point C for a changeof 10kN/m$^2$ in applied pressure. (8)

9. a. Discuss the salient features of level measurements in industrial process (5)

b..with neat diagram explain direct methods of level measurement and its disadvantages (15)

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**Wishing you All the Best**

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