Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

FOURTH SEMESTER B.TECH. (INSTRUMENTATION & CONTROL ENGG.)

END SEMESTER EXAMINATIONS, JUNE 2017

SUBJECT: INDUSTRIAL INSTRUMENTATION [ICE-2202]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A.	Derive the expression for the volumetric flow rate using rotameter and discuss	**5**
1B.	The following data relate to an orifice meter: Diameter of the pipe=240mm, diameter of the orifice=120mm, specific gravity of the oil and mercury are 0.88 and 13.6 respectively, reading of differential manometer=400mm of mercury, co-efficient of discharge of the meter=0.65. Determine the rate of flow of oil. Justify if manometer is used for the measurement of differential pressure.	**3**
1C.	Identify the flow measurement technique shown in FIG Q1C and explain its working.	**2**
2A.	The differential U tube mercury manometer is shown in FIG Q2A.Let the difference in height of meniscus between two limbs be Δh meters and the vertical height between point A in the pipe and the level of meniscus in the right limb be 'x' meters. Find the value of Δh when density of oil and mercury are 800 kg/m^3 and 13600 kg/m^3 respectively. P_A-P_B=30x10^{3}N/m^2.	**4**
2B.	Draw the different flow patterns of gas-liquid flows in horizontal and vertical view.	**3**
2C.	Explain the working of dead weight tester for the calibration of the pressure gauges.	**3**
3A.	Elaborate on the principle and working of the following level sensors: (i) Float operated voltage potential divider method (ii) Gamma ray based method.	**4**
3B.	With neat figure explain the working of dew point meter.	**4**
3C.	Discuss how LVDT can be used as secondary transducer for pressure measurement using Bourdon tube.	**2**
4A.	With neat figure and expressions, explain the working of Coriolis densitometer. Also draw and explain the signal processing diagram for the same.	**5**
4B.	Explain the measurement of pH with the help of electrochemical cell.	**3**
4C.	What are different types of air pollutants? Explain the measurement of CO.	**2**
5A.	Derive the expression for viscosity in terms of shear stress and also explain the measurement of viscosity using capillary tube method with neat figure and necessary equations.	**5**

5B. With neat figure explain the working of magnetic wind type instrument for the measurement of oxygen. **5**

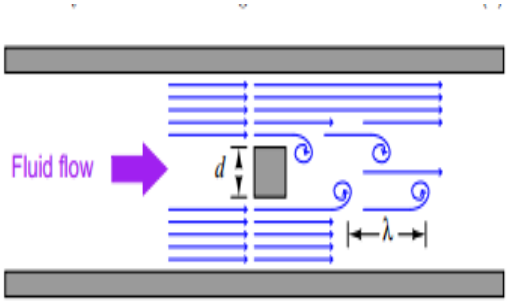

FIG:1C

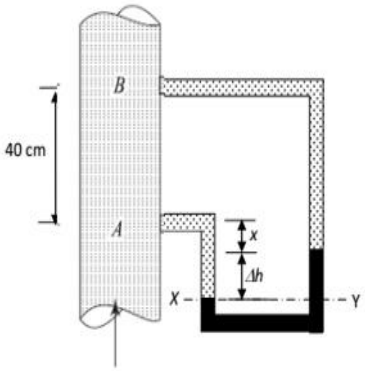

FIG:2A

********** END **********