



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH/EIE(O)/SEM-5/EI-501/2012-13

2012

INDUSTRIAL INSTRUMENTATION – II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$
 - i) Pressure gauge seal is used to
 - a) separate the process fluid from pressure gauge fluid
 - b) calibrate the gauge
 - c) increase the sensitivity of the gauge
 - d) none of these.
 - ii) Displacer type level measuring device is a type of
 - a) mechanical level sensor
 - b) electrical level sensor
 - c) thermal effect type level sensor
 - d) none of these.
 - iii) As compared with *U* tube manometer, the sensitivity of inclined tube manometer is
 - a) high
 - b) low
 - c) equal
 - d) none of these.



- iv) Mass flow meters measure
 - a) volumetric flow rate b) mass flow rate
 - c) all of these d) none of these.
- v) Which one of the following is not a variable head type flow meter ?
 - a) Orifice meter b) Flow nozzle
 - c) Dall tube d) Rotameter.
- vi) At the stagnant point of the pitot tube
 - a) velocity is very high b) pressure is very low
 - c) velocity is zero d) none of these.
- vii) A Reynolds number of 1000 indicates
 - a) turbulent flow b) laminar flow
 - c) transitional flow d) none of these.
- viii) Gauge pressure may be
 - a) positive
 - b) negative
 - c) both positive and negative
 - d) none of these.
- ix) Thermocouple is
 - a) passive transducer
 - b) active transducer
 - c) both active and passive transducer
 - d) digital transducer.
- x) Which one of the following is a thermal conductivity type vacuum pressure gauge ?
 - a) McLeod gauge b) Pirani gauge
 - c) Ionization gauge d) All of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following

3 × 5 = 15

2. a) Define absolute pressure.
b) Describe the operating principle of ring balance manometer with proper schematic diagram. 1 + 4
3. a) Name different rare metal thermocouples and mention their materials and range of temperature.
b) Describe the operation of liquid in glass thermometer with schematic diagram. 3 + 2
4. a) Describe the function of any three different types of pressure gauge accessories.
b) State the advantages of inclined tube manometers over conventional *U* tube manometers with diagram.
5. a) Describe the nuclear radiation method for level measurement.
b) How does bell gauge work ? 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.

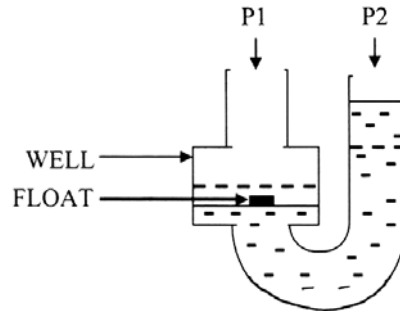
3 × 15 = 45

6. a) Derive Bernoulli's equation for measurement of flow of incompressible liquids.
b) Define Reynolds number.
c) Describe the operating principle of Bourdon tube with schematic diagram. What are the different types of errors associated with it ? 7 + 2 + (4 + 2)
7. a) State and explain the different laws associated with the operation of thermocouple.
b) How McLeod gauge is used to measure vacuum pressure ? Mention the advantages, disadvantages and range of McLeod gauge.
c) What is the resonator type pressure measuring device ?

6 + (4 + 2) + 3



8. a) A mercury manometer as shown in the figure has a float in the well. The float motion is 5 mm for a pressure of 50 kN/m^2 . If the diameter of the float chamber is 40 mm, find the required diameter for the vertical tube.



- b) How can the bellows element be used to measure the differential pressure ?
- c) Find out the flow equation of Rotameter with proper schematic diagram.
- d) What is a thermostat ? 4 + 3 + 5 + 3
9. a) Define mass flow rate. Explain the operation of turbine mass flow meter with proper schematic diagram.
- b) What are the constructional features of RTD ? Mention the operation of it. What is cold junction compensation of thermocouple ?
- c) What is vortex flow meter ? (1 + 4) + (2 + 3 + 3) + 2
10. Write short notes on any *three* of the following : 3 × 5
- Cold cathode ionization gauge
 - Thermistors
 - Capacitive level sensor
 - IC temperature sensors
 - Electromagnetic flow meters.

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