Reg. No. | | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

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

ONLINE GRADE IMPROVEMENT/MAKE-UP EXAMINATIONS, AUGUST - 2021

SUBJECT: INDUSTRIAL INSTRUMENTATION [ICE 2252]

TIME: 2 HOURS 09-08-2021 **MAX.MARKS: 40**

Instructions to candidates: Answer any *FOUR FULL* questions.

Missing data may be suitably assumed.

1A. State the thermo-electric laws. Explain the construction and working of thermocouples. Also describe any two cold junction compensation techniques for the same.

1B. Consider the temperature measuring scheme shown in Fig. Q1B. The bridge is balanced at 27°C. It uses a thermistor whose resistance at 27°C is 100kΩ and material constant of 76.75°C. Find the resistance at 125°C. Find the differential gain for the Instrumentation amplifier with output voltage 8V.

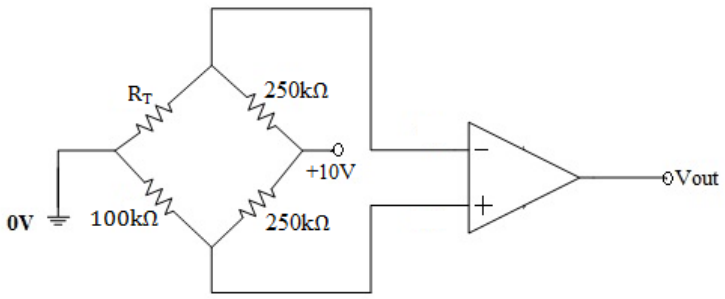

Fig. Q1B

(6+4)

2A. A multi-tube manometer using air, water, mercury and gasoline is used to measure the pressure of gasoline in a vessel as shown in Fig. Q2A. Calculate the gauge pressure in the gasoline vessel.

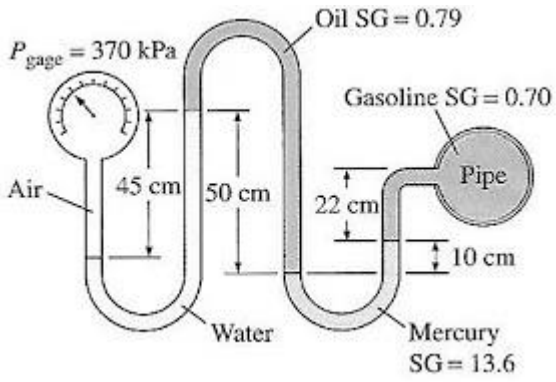

Fig. Q2A

2B. Explain the construction and working of McLeod gauge for measurement of low pressure. Also describe the calibration of a pressure gauge using Dead weight tester.

(4+6)

3A. Describe the construction and working of Orifice meter. Derive the expression for flow rate.

3B. Compare the characteristics of venturimeter and orifice meter. Calculate the flow of water through a (400x150) mm horizontal venturimeter, if the U-tube mercury manometer connected between inlet and throat of the venturi shows a differential pressure of 250mm of mercury. Assume that specific gravity of mercury is 13.6 and the co-efficient of discharge is 0.98. Water has a density of 103kg/m^3.

(5+5)

4A. Explain the operation of constant temperature and constant current anemometer.

4B With a neat diagram, describe the construction and working of electromagnetic flowmeter. Calculate the induced E.M.F in an electromagnetic flow meter due to the flow of a conductive fluid in a pipe with inner diameter of 2.75 cm. The flux density B = 6 mVsec/cm^2 and volume flow rate Q = 2500cm^3/min.

(5+5)

5A. Write the working of a level measurement system using capacitive transducer for a conducting and a non-conducting liquid?

5B. With neat figure, explain the level measurement based on gas purge system.

(5+5)

6A. Explain the measurement of speed using AC tachometer using a neat diagram. Also compare AC tachometers with DC tachometers.

6B. What is stroboscope? Explain its operation for measurement of speed.

(6+4)

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