Scheme G

Sample Test Paper- I

Course Name :- Diploma in Electrical Engineering Group

Course Code :- EE/EP **17414**

Semester :- Fourth

Subject Title :- Industrial Instrumentation

Marks :- 25 **Time:- 1 hour**

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary

Q.1 Attempt any THREE **(9 Marks)**

a) Draw the block diagram of generalized instrumentation system.

b) Define following static characteristics of instruments

i) Linearity ii) Tolerance iii) Sensitivity

c) List three passive electrical transducers.

d) Describe the working principle of LVDT.

Q.2 Attempt any TWO **(8 Marks)**

a) List the types of Load cell and describe any one with neat labeled diagram.

b) Describe working principle of thermister transducer.

c) With neat labeled diagram explain working of Hall Effect transducer for measurement of AC current.

Q.3 Attempt any TWO **(8 Marks)**

a) Explain the concept of calibration chain with a suitable example.

b) Describe junction compensation for thermocouple.

c) Draw a neat diagram of Ultrasonic level measurement transducer and state its working principle.

Scheme G

Sample Test Paper- II

Course Name :- Diploma in Electrical Engineering Group

Course Code :- EE/EP

17414

Semester :- Fourth

Subject Title :-Industrial Instrumentation

Marks :- 25 **Time:- 1 hour**

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary

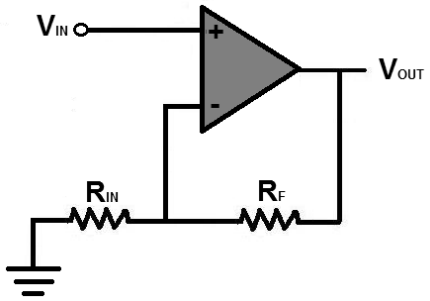
Q.1 Attempt any THREE **(9 Marks)**

a) Draw pin diagram of Op-amp IC 741 and label the pins

b) List any four criteria for selecting a transducer for an application.

c) State the concept of Ratio metric conversion and logarithmic conversion in DAS.

d) Identify the following configuration of op-amp. Write the gain equation for the same.



Q.2 Attempt any TWO **(8 Marks)**

a) Compare open loop and closed loop configuration of op-amp with neat diagram.

b) Suggest suitable transducer for measuring following parameters of steam turbine in a thermal power plant

i) Steam pressure ii) Steam temperature iii) Steam flow iv) steam turbine speed

c) Draw neat labeled block diagram of multichannel DAS

Q.3 Attempt any TWO (8 Marks)

a) Draw a neat labeled block diagram of Digital to Analog Converter.

b) State the locations of flow measurement transducers in hydro power plant.

c) Draw and describe electrical characteristics of op-amp.

Scheme G

Sample Question Paper

Course Name :- Diploma in Electrical Engineering Group

Course Code :- EE/EP **17414**

Semester :- Fourth

Subject Title :- Industrial Instrumentation

Marks :- 100 **Time:-3 hours**

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q1 Attempt any TEN of the following. (20 Marks)

a) Define i) Repeatability ii) Reproducibility

b) Draw the input output characteristics of zero drift and sensitivity drift.

c) State the difference between accuracy and precision of an instrument.

d) State the effect of hysteresis on instrument.

e) Define i) Dynamic error ii) Settling time

f) State the concept of Calibration chain.

g) List two applications of active transducer.

h) Name the metals used for resistance thermometer (RTD).

i) Draw the circuit diagram for measurement of temperature using thermocouple.

j) Draw the different forms of construction of thermistors.

k) Draw ideal voltage transfer curve for op-amp.

l) Define the following terms related to op-amp

i) Input offset current ii) Input bias current

Q2. Attempt any FOUR of the following. **(16 Marks)**

a) Draw basic block diagram of instrumentation system and label each block.

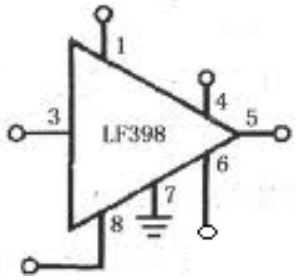
b) Describe the response of first order system with ramp input.

c) Describe the operation of Resistance strain gauge.

d) Draw the diagram of LVDT and state its working principle.

e) Draw the circuit diagram of op-amp as adder with inverting configuration.

f) Label the pin no. 1, 4, 3 and 5 in the following diagram of LF 398.

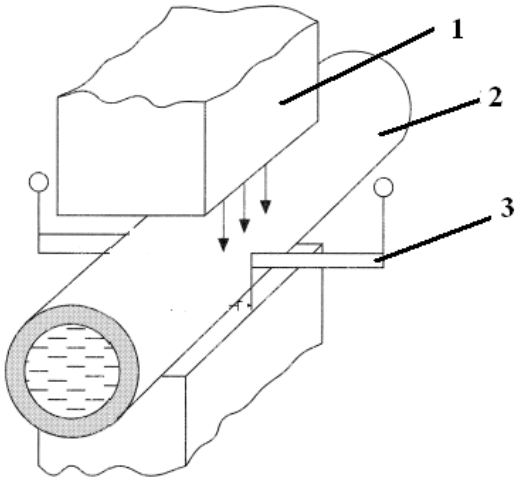


Q3. Attempt any FOUR of the following. **(16 Marks)**

a) With the help of mathematical expression describe dynamic response of zero-order instrument.

b) List any four advantages of platinum resistance thermometer.

c) Identify following transducer and label the numbered parts shown.



d) Draw the circuit diagram and input-output waveform for zero crossing detectors.

e) Describe with neat labeled diagram measurement of water flow in hydro turbine.

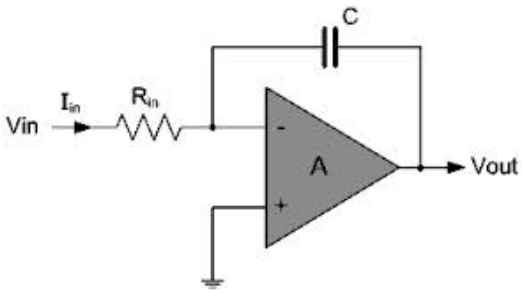
f) Compare magnetic flow meter and turbine flow meter on basis of accuracy, pressure drop, cost and application.

Q4. Attempt any FOUR of the following. (16 Marks)

a) With neat diagram describe the working of diaphragm type pressure transducer.

b) With labeled diagram explain the working of ultrasonic level transducer.

c) Identify the application of op-amp shown in following circuit diagram. Draw the same application circuit diagram in other configuration of op-amp.



d) Draw the labeled block diagram of generalized DAS.

e) Explain with suitable example the method of force measurement using load cell.

f) List any four important factors that decides the configuration of DAS

Q5. Attempt any FOUR of the following. (16 Marks)

a) List any four advantages of LVDT.

b) Describe with neat diagram working of DC tacho-generator.

c) State the effect of change in following parameters on operation of op-amp

i) Input offset voltage ii) Input offset current iii) CMRR iv) SVRR

d) With neat labeled diagram explain the working of successive approximation type analog to digital converter.

e) Draw the labeled diagram of method for measurement of speed for alternator in a power plant.

f) Select a suitable electrical transducer for following applications

i) Measurement of temperature of refrigerator

ii) Measurement of RMS value of alternating current

iii) Measurement of thermal conductivity

iv) Measurement of thickness of rolling metal sheet

Q6. Attempt any FOUR of the following. (16 Marks)

a) Describe the measurement of rotary motion using optical encoder.

b) With neat diagram explain the method of measurement of liquid level by resistive transducer.

c) Draw neat labeled diagram of single channel DAS.

d) Suggest the suitable thermocouple for following temperature ranges

i) -250^0 C to $+ 400^0$ C

ii) -200^0 C to $+ 850^0$ C

iii) -200^0 C to $+ 1100^0$ C

iv) 0^0 C to $+ 2100^0$ C

e) Draw the diagram for measurement of pressure using LVDT.

f) "Thermisters are most popularly used for temperature transducer" Justify.