17414

15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicates full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN of the following : **20**

a) Define accuracy and tolerance.

b) Give two examples of active and passive transducer.

c) Draw the pin configuration of IC 741 OP-AMP.

d) Define the following.

(i) CMMR

(ii) Slew rate

e) Draw the input / output characteristics for sensitivity drift and zero drift.

f) State seebeck effect.

g) List four factors to be considered while selecting a transducer.

h) State the working principle of turbine flow meter.

Marks

i) List two types of signal converters.

j) Name the metals used for resistance thermometer.

k) List four dynamic characteristics.

l) List two advantages of electrical transducer.

2. Attempt any FOUR of the following : **16**

a) Draw the block diagram of instrumentation system and state the function of each component.

b) Explain the working of an electromagnetic flow meter with neat diagram.

c) Label the pin No 1 to 8 of pin diagram of LF 398 as shown in Fig No. 1.

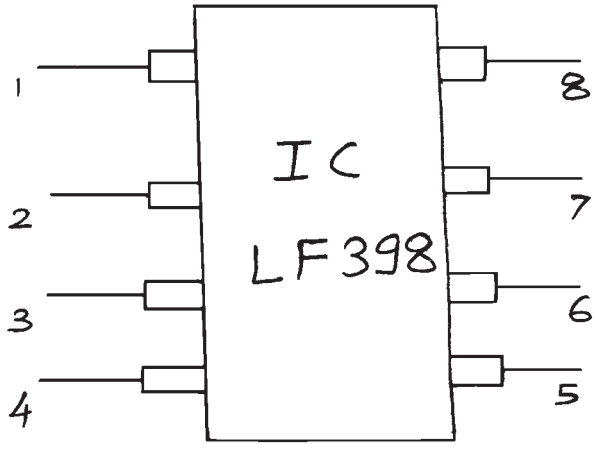

Fig No. 1.

d) Draw contructional diagram of LVDT. State its working principle.

e) Define the following terms.

(i) Precision

(ii) Resolution

(iii) Measuring lag

(iv) Dynamic error

f) Compare open loop and closed loop configuration of OP-AMP with neat diagram. (Any four points)

Marks

3. Attempt any FOUR of the following : **16**

a) Draw ideal characteristics of :

(i) Low pass filter

(ii) High pass filter

(iii) Band pass filter

(iv) Band stop filter

b) Draw and explain the block diagram of multi-channel DAS.

c) What is thermocouple ? Explain its working.

d) Explain the force measurement using load cell.

e) Explain with neat sketch construction and working of bonded strain gauge

f) Write comparison between magnetic flow meter and turbine flow meter on the basis of accuracy, cost, pressure drop and application.

4. Attempt any FOUR of the following : **16**

a) Draw a block diagram of generalised data acquisition system. State function of each block.

b) Write stepwise procedure to carry out calibration.

c) Draw the response of first order instrument to step input and explain it.

d) Define transducer. Give the classification of transducer with one example each.

e) Define the following terms related to OP-AMP.

(i) Supply voltage rejection ratio

(ii) Output voltage swing.

(iii) Input offset voltage.

(iv) Input bias current.

f) Give the comparison between thermistor and RTD (Any four points).

Marks

5. Attempt any FOUR of the following : **16**

a) Draw and explain pressure measurement using diaphragm type transducer.

b) Explain construction and working principle of photo electric type non-contact tachometer with diagram.

c) Write four objectives of Data Acquisition system.

d) Draw and explain circuit diagram of phase detector.

e) Explain with diagram liquid level measurement using ultrasonic method.

f) Draw the neat sketch of diaphragm. Explain its construction and working.

6. Attempt any FOUR of the following : **16**

a) Define torque. Explain measurement of torque using torque cell.

b) Define stress and strain. List types of strain gauges.

c) Draw and explain ratio metric conversion.

d) Explain rotary motion measurement system using optical encoder.

e) Give difference between active and passive transducers. (Any four points)

f) Explain AC current RMS indication using hall effect transducer.
