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Printed Pages : 3 **EE – 801**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2030 Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2006-07

INSTRUMENTATION & PROCESS CONTROL

Time : 3 Hours] *[Total Marks : 100*

1 Attempt any **four** parts of the following : **5×4=20**

(a) What is an input device? What is primary sensing element and why is it important? Name different types of pressure elements.

(b) What is an electrical transducer? What are its advantages over the mechanical transducers? What are the basic requirements of a transducer?

(c) Discuss in brief the static performance characteristics of an electrical transducer.

(d) Describe any two methods for measuring dynamic force with the help of transducer. Also give a comparison of the two methods.

(e) Define the term "Gauge factor". Write in brief about semi-conductor type strain-gauges.

(f) The temperature of a furnace is measured by means of a platinum resistance thermometer. The resistance of the thermometer is **4.5** Ω at at **0°C, 7.500** Ω at **100°C** and **14.00** Ω at

400°C. Find the temperature constant of the instrument and hence the true temperature when the resistance is **10.00** Ω. Use the formula **Rt=Ro (1 + α t)** for the range **0-100°C** and the correction **Dt = δ .t (t-100°C)** for the range about **100°C** to obtain true temperature.

2 Attempt any **four** parts of the following : **5×4=20**

(a) What is pilot tube? With the help of suitable diagram describe its use in flow measurement.

(b) What is LVDT? Write its merits and demerits. Discuss its any two applications.

(c) What is a piezoelectric transducer? Give its equivalent circuit. Derive an expression for the output voltage by making suitable simplifying assumptions.

(d) What is Hall effect? Why is it more pronounced in semiconductors than in metals? Describe the working principle, construction and applications of hall-effect transducers.

(e) What is telemetry and what are its components? Describe motion and force balance current telemetering systems and also give their relative merits and demerits.

(f) What is impulse telemetering system? Explain the various impulse telemetering systems.

3 Attempt any **two** parts of the following : **10×2=20**

(a) Explain the working principle of any two methods of analog-to-digital conversion. Also, compare their relative merits and demerits.

(b) What are the important requirements of a signal conditioner and how are they met.

(c) What is a Data Acquisition System (DAS)? Explain the role played by its different elements. Also, describe various types of multipliers used?

4 Attempt any **two** parts of the following : **10×2=20**

(a) What are the basic control actions used in industrial analog process controllers? Give their brief description.

(b) What are the important limitations of pneumatic controllers? Give a brief description of such a controller.

(c) What is a 'ON-OFF' controller? Explain its working with a suitable example and also give its advantages, disadvantages and any two applications.

5 Attempt any **two** parts of the following : **10×2=20**

(a) Explain the working principle of a storage oscilloscope. Give its salient features.

(b) Describe the working principle and also the features of a self-balancing type servo-strip chart recorder.

(c) Give the block diagram representation of a micrtoprocessor based instrumentation to be used a DAS for measuring temperature, pressure and flow-rate of a boiler. Discuss its various aspects in terms of transducers and interfacing aspects. Also, mention its important features.
