

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

PAPER ID : 0287

Roll No.

--	--	--	--	--	--	--	--	--	--

B. Tech.

(SEM. VIII) THEORY EXAMINATION 2010-11
INSTRUMENTATION AND PROCESS CONTROL

Time : 3 Hours

Total Marks : 100

Note :—Attempt all questions.

1. Attempt any four parts of the following :— (5×4=20)
 - (a) What is an electrical transducer ? What are the advantages of electrical transducer ?
 - (b) What is LVDT ? Draw the circuits of an LVDT. Also show the variation of output voltage with linear displacement for an LVDT.
 - (c) Explain with the help of diagram the theory of strain gauge. A resistance wire strain gauge uses a soft iron wire of small diameter. The gauge factor is +4.2. Neglecting the piezoresistive effect, calculate the Poisson's ratio.
 - (d) Explain with the help of diagram measurement of temperature with thermocouple. Write its advantages and disadvantages.
 - (e) Explain with diagram the different forms of thermistors. Explain any one of its applications.
 - (f) Draw and explain the input, transfer and output characteristics of transducers.

2. Attempt any four parts of the following :— (5×4=20)

- (a) Explain the resistive method for the liquid level measurement. Also discuss the advantages of this method.
- (b) Discuss the various types of angular velocity of measurement transducer.
- (c) With suitable diagram explain the moving coil type velocity transducer.
- (d) What is Hall Effect ? Describe the working principle, construction and applications of Hall Effect transducers.
- (e) What is pilot tube ? With the help of suitable diagram describe its use in flow measurement.
- (f) What is impulse telemetry system ? Explain the various impulse telemetry systems.

3. Attempt any two parts of the following :— (10×2=20)

- (a) A P.M. transmitter operating at a carrier of 100 MHz with a carrier voltage of 8 V. The modulating signal has amplitude of 3 V and a frequency of 6 kHz resulting in a deviation of 60 kHz. Write the voltage equation for the following conditions :
 - (i) Original value
 - (ii) Audio amplitude increased by 4 V
 - (iii) Audio frequency increased to 8 kHz
- (b) (i) What is Data-Acquisition system ? Explain with the help of diagram Modern Digital Data Acquisition system.
 - (ii) What are the different types of telemetry systems ? Explain land line telemetry.

(c) Find the carrier and modulating frequencies, the modulation index and the maximum deviation of the F.M. wave represented by $e_{fm} = 12 \sin (6 \times 10^8 t + 5 \sin 1200 t)$ V. What power will this F.M. wave in a 10Ω resistance ?

4. Attempt any two parts of the following :— (10×2=20)

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

(b) With neat diagram explain the working principal of X-Y recorders. Also write its three applications.

(c) What is a ON-OFF controllers ? 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 following :

(i) Process

(ii) Controlled variable

(iii) Set point

(iv) Self regulation

(v) Sensor.

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

(c) With suitable example explain the pneumatic control of any process in an industry. Also draw the related block diagram.