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Printed Pages : 3 TME – 404

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

PAPER ID : 4082 Roll No.

B. Tech.

(SEM. IV) EXAMINATION, 2006-07

MEASUREMENT, METROLOGY & CONTROL

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

Note : *Attempt **all** questions.*

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

(a) Explain the following terms related to the instruments :-
   (i) Sensitivity (ii) Linearity

(b) Discuss the dynamic performance characteristics of first order instrument in case of ramp input

(c) Distinguish between the active instruments and passive instruments giving suitable examples.

(d) Discuss the methods of calibration of an instrument.

(e) Describe the data transmission, signal conditioning and data presentation elements.

(f) Distinguish between :
   (i) Observational and chaotic errors.
   (ii) Modifying and interfering inputs.

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

(a) Discuss an unbalanced wheatstone bridge circuit used in strain measurement. Mention one backing and are bending material used in electrical resistance strain gauge.

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(b) Describe the principle of operation of a McLeod gauge

(c) State the law of intermediate temperature and intermediate metal for thermocouple.

(d) Write short note on accelerometer.

(e) What does mean by elastic transducer ? Describe an elastic transducer used for force measurement.

(f) Describe the construction of a linear variable differential transformer. Sketch its typical input-output graph.

3. Attempt any **four** parts of the following :- **4×5 = 20**

(a) What are 'Line Standard' and 'End Standard; ? How do they differ?

(b) What does mean by 'Fits' ? Discuss clearance, transition and interference fits, giving suitable sketches.

(c) What does understand by the term 'Inter changeability' ? State its significance with regard to the mass production of identical parts.

(d) Sketch 'Sigma Comparator'. Mention its salient features.

(e) Discuss the Taylor's principle of gauge design.

(f) State the applications:

(i) Slip gauges

(ii) Angle plote

(iii) V-block

(iv) Straight edges

(v) Universal surface gauge

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

(a) Define the terms "Primary texture" and "Secondary texture". Describe construction and working principle of an instrument used for measurement of surface texture.

(b) What are interferometers? What are their advantages over optical flats? Describe the working principle of Michalson Interferometer.

(c) List the uses of 'Auto-collimator. Sketch and describe the working principle optical system of auto-collimator.

5. Attempt any **two** parts of the following :- **2× 10**

(a) Discuss the basic components of a control system. Distinguish between the manual and automatic control system and list some of engineering situation where the automatic control becomes necessary.

(b) Draw the schematics of a general pneumatic control system and describe the function of its various elements in brief. How does the force balance controller differ from the mention balance controller?

(c) Write short note on any **one** :-

(i) Servomechanism

(ii) Electrical Controller.
