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tal No. of Questions : 09]

[Total No. of Pages : 03

B. Tech. (Sem. - 5th)

MECHANICAL MEASUREMENT AND METROLOGY

SUBJECT CODE : ME - 307

Paper ID : [A0817]

[Note : Please fill subject code and paper ID on OMR]

me : 03 Hours

Maximum Marks : 60

struction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

1) *(10 × 2 = 20)*

a) Define the term standard with reference to measurement.

b) What is a ramp input signal?

c) Name the techniques used for flow visualisation.

d) State the law of intermediate metals in the context of thermocouples.

e) What is a strain gauge rosette?

f) Errors which may be variable both in magnitude and nature (positive or negative) are identified as

(i) Hysteresis.

(ii) Random error.

(iii) Systematic error.

(iv) Interaction error.

g) The speed of response of a first order system is judged by

(i) Time constant.

(ii) Dead time.

(iii) Rise time.

(iv) Damping ratio.

h) The rotating speed of a sealed compressor can be measured by

(i) Straba scope.

(ii) Vibrating read tachometer.

(iii) Capacitive speed pick up.

(iv) Tachoscope.

i) Amongst the following flow measuring devices, pressure recovery is maximum in

(i) Pitot static probe.

(ii) Flow nozzle.

(iii) Orifice plate.

(iv) Venturimeter.

j) Match the following sets.

(i) Talysurf	(1) Thread characteristics
(ii) Clinometer.	(2) Thickness of a clearance
(iii) Tool maker's micro scope	(3) Roughness.
(iv) Feeler gauge	(4) Angular deflection.

Section - B

(4 × 5 = 20)

Q2) Sketch a Bourdox tube pressure gauge. Identify and explain the transducer, signal conditioner and display element in this measurement system.

Q3) Explain the difference between the following set of terms as applied to the act of measurement.

(a) Accuracy and precision.

(b) Resolution and threshold.

(c) Dead time and dead zone.

Q4) Describe the working principle of a linear variable differential transformer (LVDT). Mention the quantities which can be measured by this device. Enumerate the advantages and disadvantages of using this device.

Q5) Name the devices used for low pressure measurement. Mention the ranges they cover.

Describe, with a neat sketch, the construction and working of a Mcleod gauge.

Q6) Distinguish between the absorption, transmission and driving type of dynamometers.

Sketch and explain the device you would use to measure torque being transmitted by a rotating shaft.

Section - C

(2 × 10 = 20)

Q7) (a) What is a comparator? How does it differ from a measuring instrument.

Describe, with a neat sketch, the essential features of sigma comparator.

(b) Draw a neat sketch showing the internal details of a dial indicator. How can the roundness of a cylindrical object be checked with it? What other accessories would be required for this check?

Q8) Present a detailed account of electrical resistance strain gauges. The account should include:

- Basic principle.
- Gauge and binding materials.
- Associated circuitary for the measurement of output.
- Need and technique for temperature compensation.

Q9) (a) Describe a total radiation pyrometer for measuring the temperature of a target which is remote and inaccessible such as the interior of a furnace.

(b) Explain the various aspects of the general form of report writing which is considered adequate for an experiment conducted in the laboratory.