Paper Code: ME-403 **Roll No.** | | | | | | | | | | |

B.Tech.
(SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
MEASUREMENT & METROLOGY

[Time: 2 hrs.] **[Max. Marks: 50]**

Note:- Attempt All Questions. All questions carry marks shown against each.

1. Attempt any four parts of the following: - **[3x4=12]**

(a) Why are purely mechanical instruments unsuitable for dynamic measurements?
(b) What is an error calibration curve and what is its utility?
(c) A mercury thermometer has a capillary of 0.25 mm diameter. If the bulb and capillary tube are made of a zero expansion material, what volume must the bulb have if a sensitivity of 2.5 mm/^{0}c is desired? Coefficient of volumetric expansion of mercury is 0.181×10^{-3} per degree C.
(d) What is meant by" linearity". How does it affect performance of an instrument?
(e) What is a transducer? Bring out the difference between an "active" and "passive" transducer. Do they have loading effect?
(f) How can the range of mercury in glass thermometer be increased?

2. Attempt any two parts of the following:- **[6x2=12]**

(a) Explain how a force can be measured with the help of a pneumatic load cell.
(b) Describe a Mcleod gauge. What is it used for and how?
(c) A first order thermometer is used to measure the temperature of air cycling at a 1 cycle every five minutes. If the same thermometer, initially at 0^0, is immersed in boiling water, it registers a temperature of 63.2^0C after 20 seconds. Calculate the percentage attenuation of air temperature as read by the thermometer. If the temperature of air has a sinusoidal variation of $\pm 20^0$c, what will be the indicated temperature?

3. Attempt any **t**hree parts of the following: - **[4x3=12]**

(a) What is meant by limit gain? State and explain Taylor's principles of gauge design.
(b) Draw a neat sketch and explain the working of SIGMA comparator.
(c) A spirit level gauge has a base 30 cm long. When a 5 mm high shim is placed at one end of the base, the bubble in the spirit level shifts by 2.5 mm. Calculate the radius of curvature of the glass tube of the spirit level.
(d) Differentiate between the terms "Tolerance" and "Allowance". Define allowance.
What do you understand by 50 H_7 - 50 g_8? Explain in detail what kind of fit will result?

4. Attempt any two parts of the following: - **[7x2=14]**

(a) Explain "three – wire" method of measuring simple effective diameter of screw threads.
(b) Describe one extrinsic and one intrinsic method of checking circularity. Which method will yield more accurate result?
(c) Explain the meaning of "SURFACE TEXTURE". Describe at least 2 criteria adopted for checking surface finish and giving it a quantitative value.