

National Institute of Technology Hamirpur

Department of Mechanical Engineering

End Semester Examination (December 2020)

Sub.: Metrology and Measurement (ME-214)

Time: 02 hrs.

Instruction: All questions are compulsory and carry equal marks.

Assume suitable data and clearly mention it, if needed.

1. Define straightness? Write the name of two instruments used for straightness measurement. How straightness measurement is correlated with flatness measurement?
2. Explain why it is preferred not to use a Sine bar for generating/measuring angles larger than 45° , if high accuracy demanded? **Explain by supporting the answer mathematically.**
3. Define strain? Explain in brief a strain measurement technique with clear schematic labelled diagram.
4. Where thermocouples and pyrometers are used? Explain separately their working principles and the associated limitations of these instruments.
5. Explain in short about tachometers, stroboscope, accelerometer and proving ring separately. How power developed by an engine is measured?
6. Define fit. Define different types of fits and show these types through schematic sketch. Also write at least one example from each types of fit.
7. A hole and shafting system has the dimensions: 50 H8/c8. Sketch the fit and show these upon the actual dimension of hole and shaft. Use the following data:

Diameter 50 lies in the diameter step of 50 to 80 mm.

Fundamental tolerance unit, $i (\mu\text{m}) = 0.45 D^{1/3} + 0.001 D$

where D is the representative size in mm;

Tolerance value for IT8 = $25i$

Fundamental deviation for c shaft = $-(95+0.8D) \mu\text{m}$

8. Define roughness, form and lay. Represent these through a schematic diagram.

ALL THE BEST