

MEL786 - Metrology
(II Semester 2006-07)
Major

Max.Marks:30
Time :2 Hrs

Answer all the Questions:

1. A 100 mm sine bar has to be set up at an angle of 60° . Determine (i) the slip gauges needed. (ii) In setting the sine bar to the above angle, what errors will be introduced if
 - (a) the assumed 100 mm roller separation is actually 100.005 mm?
 - (b) the upper cylinder of the sine bar is 0.002 mm bigger than the actual size?
 - (c) the slip gauges used have an unsuspected error of 0.005 mm?

(iii) What is the value of the angle set considering all the above errors? (6)
2. (a) Explain how are rake correction and elastic compression correction applied in thread measurements. (3)
(b) Give the sources of pitch errors in threads. Explain the experimental method of measuring the thread pitch. (3)
3. (a) Define "Lay" in surface finish measurements. What is its significance? Indicate the lay for any three manufacturing processes. (3)
(b) Observation of a slip gauge in a flatness interferometer produced fringe counts numbering 10 & 14 for two observations (one by rotating exactly 180° without disturbing the relative set up). Assuming both the faces of the gauge are flat, calculate the error in mm in parallelism if the radiation wavelength is $0.5086 \mu\text{m}$. Justify (derive) the formula used if any. (3)
4. An auto-collimator and reflecting block were used to measure departure from straightness of a rectangular section straight edge, which was supported at the points for minimum deflection. The center distance of the plane reflector was 70 mm and the auto-collimator readings (in minutes) were:
+0.5, +0.8, -0.3, 0, +1.0, +0.5, -0.2, 0, -0.5, +1.2
Determine the straightness of the given object. (6)
5. (a) Explain the method of fractional coincidences in the measurement of end gauges by interferometry. (3)
(b) Explain the types of pitch errors for screw threads and sketch & explain pitch measuring equipment. (3)