MEL786 - Metrology
(II Semester 2009-10)
Major

Max.Marks:30
Time: 2 Hrs

Answer all the Questions:

1. (a) A vial is to be produced to a sensitivity of 5 seconds of arc for a bubble movement 2mm. To what radius must it be ground? Explain how a precise spirit level is produced. (3)
   (b) Distinguish between the lead and the pitch.
   When measuring a major diameter of an external screw thread gauge of 3mm pitch, a 35.5 mm diameter cylindrical standard was used. The micrometer readings over the standard and gauge were 9.3768 and 11.8768 mm respectively. Calculate the helix angle of the thread? (3)

2. (a) Explain the method of fractional coincidences in the measurement of end gauges by interferometry. (2)
   (b) While measuring a slip gauge of 10 mm nominal length, using the red, blue and green light of a cadmium lamp of which the wave lengths are,

Red	-	0.6438 μm
Blue	-	0.4800 μm
Green	-	0.5086 μm

   and the observed fractional displacements are 0.8, 0.5 and 0.9 respectively. What is the actual length of this gauge? (4)

3. A 100 mm sine bar has to be set up at an angle of 60^0. 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)

4. (a) Sketch and explain a fully automated gauging system for in-process control of a centreless grinding operation. (3)
   (b) How will you measure diameter of a cylindrical plug gauge with the help of a given standard slip gauge and an optical flat (Derive the expression) (3)

5. (a) Mention the various methods of flatness measurement. Explain the method of measuring the flatness of a surface (step by step) using autocollimator. (4)
   (b) What is the significance of Airy points in the context of measurement? Obtain the position of Airy points for the length bar of 500 mm to be placed horizontally. (2)