

2007 MEC603 ADVANCED METROLOGY AND COMPUTER AIDED INSPECTION TEST II

Max. Marks: 20

Time: 50 minutes

1. The wall thickness of a boiler is specified as $40+0.20\text{mm}$. At one point, the wall thickness measured (40.015 ± 0.02)mm. Is the thickness acceptable? Consider guard bands of 100% and 50%, and explain your result. (2 marks)
2. Explain the mechanism of the touch trigger probe commonly used in CMMs. (2 marks)
3. What are the factors to be considered while planning the sampling strategy using a CMM? How do they affect measurement results? (2 marks)
4. Explain the four reference circles commonly used for fitting a circle. (4 marks)
5. What is the importance of "datum" in manufacture and measurement? (2 marks)
6. Show how tolerances on position are given on the drawing, with an example. How are they interpreted? (2 marks)
7. What was the problem in CMMs, which resulted in a GIDEP alert? (2 marks)
8. What is cut-off? What is its importance in surface roughness measurement? (2 marks)
9. A surface profile was obtained as a series of heights from a datum in steps of 0.05mm as: -3.1, 7.6, 4.4, 4.1, 1.8, 3.7, -3.6, -4.5, 1, 0.6, 6.4, -1.1, 2.8, -0.4, -4.2, 1.4, -7.3, -7.4, -0.3, -1.9 (μm). Calculate R_a assuming that the surface is well aligned with respect to the datum. (2 marks)

SOLUTIONS TO NUMERICALS:

1. Boiler, hence stringent acceptance. 100% Guardband: Reject. 50% Guardband: Accept
9. Mean = 0, $R_a=3.38\mu\text{m}$