2011 ME6303 Advanced Metrology and Computer Aided Inspection – Test 1

Max. Marks: 20 Approved tables are permitted Time: 50 minutes

1. A standard potential of 1.6 V was given to a voltmeter and five readings were 1.61, 1.64, 1.63, 1.62, 1.63. Estimate the systematic error of the gauge. Calculate the random error for the first reading.

(2 marks)

2. Define the term Calibration according to VIM 2008. How is it connected to traceability?

(2 marks)

3. Which is the only SI base unit that is realised by means of an artefact? What are the proposals to modify this definition?

(2 marks)

4. The price of gold for the last ten days is given in table below. Estimate the price of gold for day 11 assuming a straight line relationship with respect to day number. Also determine a 90% uncertainty interval for the y-intercept in the regression model.

Day	1	2	3	4	5	6	7	8	9	10
Price	1623	1638	1669	1679	1659	1693	1736	1772	1760	1736

(9 marks)

5. The velocity of water V leaving from an orifice at a height h below the water level is given by $V = \sqrt{2gh}$. The height h was measured five times and the results obtained as as 1.22, 1.23, 1.22, 1.24, and 1.25 m. The value of g is given in a handbook as 9.8 m/s^2 and it is stated that the error in this value will not exceed 0.1 m/s^2. Estimate the velocity of water and its standard uncertainty.

(5 marks)