

**2011 ME6303 ADVANCED METROLOGY AND COMPUTER AIDED INSPECTION TEST II**

Max. Marks: 20

Time: 60 minutes

(All questions carry two marks each, unless otherwise mentioned)

1. The power consumed by a device was determined by measuring the current and voltage. The uncertainty budget (incomplete) is given below. Determine a 90 % expanded uncertainty interval for power.

	Mean	Unit	Std uncertainty	dof	Sensitivity	Contribution
Voltage	220	V	10	5	2.5	25
Current	2.5	A	0.2	7	220	44
Power	550	W				

2. The wall thickness of a costly toughened windscreen is specified as 12+0.8 mm. A sample on measurement showed a thickness of 11.8 mm with expanded uncertainty U=0.3 mm. Is the windscreen acceptable for a guard band of a) 100 % b) 50 %. Give reasons.
3. Differentiate between Conventional and Coordinate metrology.
4. Discuss the common bearing systems used in CMMs.
5. What are the common applications of Machine Vision in manufacturing?
6. Both CCD and CMOS sensors cannot distinguish colour. Then, how are they used to sense colour images?
7. What is directional lighting? Where is it used?
8. What do you mean by irrelevancy reduction? Which file formats use this strategy?

p=3	8	4
4	q=5	6
3	6	7

9. Define m-connectivity. Are p and q m connected for the range {2,5} in the image Explain why or why not.

10. Determine the result of median filtering with a 3X3 mask on the image 
$$\begin{bmatrix} 1 & 2 & 1 & 2 \\ 4 & 7 & 4 & 5 \\ 1 & 4 & 5 & 4 \\ 4 & 5 & 4 & 3 \end{bmatrix}$$
 limiting excursions of the mask till the border.

11. Explain how discontinuities can be detected in images.