Department of Applied Mechanics (Semester - II - 2006-2007)

AML-700 Experimental Methods in Solids & Fluids.

MAJOR EXAM

Time 8-10 Am Max Marks - 80

Note : Attempt all Questions

Q1 The diameter of a shaft was measured repeated by fifty times. The aritmetic mean of the measurements was 14.5832 and the mean ~~standard~~ squared deviation was 0.1056 cm^2. Calculate the best estimate of the True diameter as well as its accuracy upto the significant number of decimal places. (6)

Q2. The discharge through a river is estimated at (200 ± 2) m^3/sec by the salt method, (205 ± 3) m^3/sec by the float Method and (204 ± 1) m^3/sec by the pitot integration method. From these observations, determine the most likely discharge and its standard error. Prove any formula used. (8)

Q3. The three interior angles of a triangle were measured to be $\angle A = 31^\circ$, $\angle B = 62^\circ$ and $\angle C = 88^\circ$. It has been estimated that $\angle A$ has been measured with twice the accuracy as compared to other two angles. Using the method of Least squares and the fact that the sum of the angles must be 180°, Find the most probable values of the angles. (8)

Q4. A test is conducted to determine the effect of cigarette smoke on the weight of mice. One group is fed a certain diet while being exposed to a controlled atmosphere containing smoke. The other group is fed the same diet but in a clean atmosphere, the observations are as follows

	Gained weight	Lost wt	Total.
Exposed to smoke	61	89	150
Exposed to clean air	65	77	142
Total	126	166	292

Use the χ^2 test to test the hypothesis that the presence of smoke causes loss in weight (7)

Q5. Derive the relations of amplitude ratio and phase difference for a 2nd order system with harmonic input. Explain with figures. (8)

Q6. Explain the Working Principle of the following

(i) Refrigeration and load relaxation Techniques of brittle coating (5)

(ii) Set up for Generating isochromatic fringe pattern (4)

(iii) Strain rosettes (4)

(iv) optical Method for measuring displacement (4)

(v) Mcleod Gauge (4)

(vi) Pitot static tube (4)

Q7. Write short notes

(i) Polarized light and Quarter wave plate (3)

(ii) Turbine Flowmeter (3)

(iii) Measurement of Reynolds stresses using hot wire Anemometer (3)

(iv) Principle of Laser Doppler Velocimeter and Method for Analysis of Particle size (5)

Q8. Design an Annubar with six holes on the front face with only one hole on the reverse face. The distance of the two holes close to the symmetric axis is 17 mm (4)