

Bachelor of Engineering (Mechanical Engineering) - Third Year - Second Semester

Experimental Method in Fluid Dynamics

Time : 3 hours

Full Marks: 100

Answer any 4 [four] questions

- 1a. Explain the relative advantages and disadvantages between null and deflection methods of measurement. 8
 b. What are the different methods of correcting spurious inputs of a measurement system? Explain two of those with suitable examples. 4+8
 c. Distinguish between analog and digital modes of operation. 5
- 2a. Explain the basic functional elements of a measurement system with two suitable examples. 15
 b. Explain static calibration and mention the basic steps of the same. 5
 c. What do you mean by Gimbal suspension? Where is it used? 5
- 3a. Explain: Static sensitivity, Linearity, Resolution, Dead space, Threshold, Hysteresis. 6 x 2
 b. What do you mean by loading effect? 5
 c. The power transmitted by a rotating shaft is given by,
 $W = 2\pi RFL/t$
 where,
 $R = 1202 \pm 2$ [rev] is the revolution of shaft during time, t .
 $F = 45 \pm 3\%$ [N] is the force at end of torque arm.
 $L = 0.397 \pm 1\%$ [m] is the length of the torque arm.
 $t = 60 \pm 5$ [sec] is the time length of run.
 For 95% reliability find the uncertainty in measuring W . 8
- 4a. Find out the uncertainty in measurement of power output [P], for the following case.
 The Voltage [V] is measured 10 times as 220.0, 221.8, 221.0, 220.9, 220.8, 220.0, 219.7, 219.1, 220.1, 219.9 [in volts]. The Resistance [R] is measured 8 times as 6.0, 5.9, 5.9, 6.0, 6.1, 6.2, 6.0, 5.8, 5.9, 6.1 [in Ohm]. Given
 $P = V^2/R$ 17
 b. What is the difference between active and passive transducer? Explain with examples. 8
5. Cite a suitable example of a zero-order instrument and find the input output relationship for the same. With suitable plot explain its step and ramp responses. 12+6+7