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Total number of printed pages – 2


B. Tech
PCME 4403

Seventh Semester Examination – 2011
MECHANICAL MEASUREMENT AND CONTROL

Full Marks – 70

Time : 3 - Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.

1. Answer the following questions :  2×10
- (a) Explain the static and dynamic error coefficients.
 - (b) Define precision and accuracy.
 - (c) What is meant by linear working range of a LVDT ?
 - (d) Identify all the terms used in the Mason's Gain Formula.
 - (e) What are the objectives of calibration of measuring instruments ?
 - (f) Explain the terms hysteresis and drift.
 - (g) Distinguish between analog and digital transducers.
 - (h) State and explain the laws of thermocouples.
 - (i) State the significance of signal flow graph.
 - (j) Differentiate between strain gauge and strain rosette.
2. Explain the principle of operation of a LVDT and sketch the input-output graph. Discuss its merits and demerits. 10
3. (a) Explain with a neat sketch, the working principle of the strain gauge ballast circuit. 5
- (b) With a suitable sketch describe the working principle of a variable area meter and show that the rotameter gives a direct reading of the float on a linear scale. 5

P.T.O.

4. A gas flows through a pipe of 20 cm diameter at the rate of $135 \text{ m}^3/\text{hr}$ having a density of 0.75 kg/m^3 . The flow is measured by a Pitot static tube located centrally in the pipe and differentially connected to an inclined manometer (inclination = 1 in 12). The manometric liquid has a specific gravity of 0.85. If the average velocity is 0.8 times the maximum velocity, determine the manometric reading for this flow. 10
5. Classify all the pressure measuring transducers. With a neat sketch explain the working of a McLeod Gage for measurement of very low pressure. 10
6. With neat sketches compare the relative merits and demerits of venturimeter, nozzle meter and orifice meter. 10
7. (a) Compare between open loop and closed loop control systems with suitable examples. 5
- (b) What are the various methods adopted to reduce block diagrams to find out overall transfer function? 5
8. (a) Define stability in a control system. 2
- (b) Determine the range of K for which the following unity feedback system will be stable. 8

$$G(s) = \frac{K}{s(s+1)(s+2)}$$