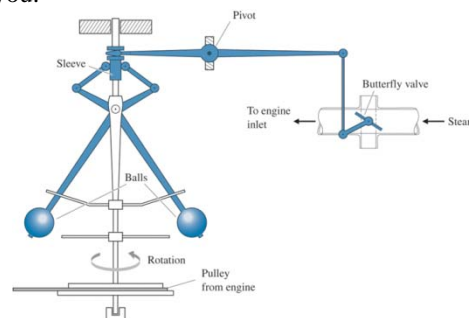


ESE 406/505 & MEAM 513 – 2011-Jan-24 – Quiz – Name: _____

- Choose only one answer (A through D) for each question by circling the letter.
- A correct answer is worth 2 points.
- No answer is worth 0 points.
- An incorrect answer is worth -1 point. Random guessing will hurt you.

1. Which of the following statements is NOT correct concerning the “fly-ball governor” shown at right?

- It is also called a “centrifugal governor”.
- Such devices were made famous by their application to control of steam engines by James Watt.
- Watt used differential equations to prove that a steam engine controlled with a fly-ball governor was stable.
- The angle of the balls from vertical increases as the engine speed increases.



2. Which of the following is an example of a performance requirement that might be used in the design of a control system?
- Command Response = making the output respond properly to inputs.
 - Disturbance Rejection = preventing the output from responding to disturbances
 - Noise Suppression = preventing the output from responding to noise in measurements used for feedback.
 - All of the above are examples of performance requirements.

3. The reaction wheel in the Hubble Space Telescope, shown at right, is an example of what type of system element?

- Actuator
- Sensor
- Analog Computer
- None of the Above



4. Which of the following is correct concerning the equation

$$\frac{d^2 y}{dt^2} + 2\zeta\omega_n \frac{dy}{dt} + \omega_n^2 y = \omega_n^2 u ?$$

- ω_n is the natural frequency.
- ζ is the complementary frequency.
- The equation is non-linear because ω_n is squared.
- All of the above are correct.

5. Which of the following is a correct statement about the equation $M = I \frac{d^2 \theta}{dt^2}$?

- M is the moment about an arbitrary point on the body.
- I is the electrical current flowing through the body.
- $\frac{d^2 \theta}{dt^2}$ is the angular acceleration of the body.
- The equation applies to each axis of a body undergoing arbitrary 3-dimensional rotational motion.