FACULTY OF ENGINEERING AND TECHNOLOGY
LEVEL 300 COMPUTER ENGINEERING
SECOND SEMESTER EXAMINATION
JULY 2013

Course Title: Systems Engineering
Course Code: EEF 316
Course Instructor: Professor Tanyi Emmanuel
Time: 3 Hours

Tables of Laplace Transforms are allowed

Question 1

Potentiometric transduction is widely used in the design of sensors.

a) List the types of sensors which are based on this principle
b) For each sensor in (a), use an illustrative diagram to briefly describe its functionality.
c) Draw a two-subsystem model of a potentiometric linear displacement sensor. One of such sensors is designed to provide an output of 100 millivolts per cm of linear displacement. The length of the potentiometer is 50 cm. What is the constant voltage supplied across the potentiometer?

Question 2

a) Use an illustrative diagram to ***briefly*** describe the operational principle of a ***Tachometer.***
b) A tachometer has 240 gear-teeth imprinted at regular intervals around the periphery of a disc. When the tachometer is used to measure the Angular Speed of an object it generates 600 pulses per second. What is the Angular Speed?
c) With the use of an illustrative diagram ***briefly*** describe how you would convert the tachometer in (a) to a sensor for the measurement of the Flow Rate of a liquid.
d) ***Briefly*** describe how you would use a tachometer as an ***Angular Encoder***
e) An Angular Encoder with 240 ferromagnets is used to measure an Angular Displacement of 30 degrees. How many pulses are generated by the encoder? Give a binary representation of this number of pulses

Question 3

A system for the control of the Angular Speed of a motor is shown in fig.1.

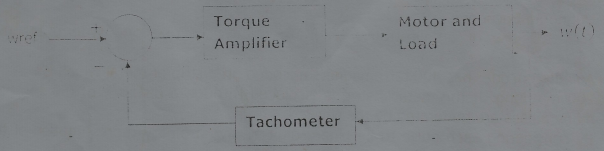

Fig. 1: Speed Control System