Minia University Faculty of Eng. CSE Dept. Lab. 4 Total Marks: 120	4th Year Final Exam May 2017 Code: CSE411 Time: 3:00 hrs

1. [*30 Points*] The Internet of Things (IoT) refers to the products that will be connected in the future. Information from our products will be sent to our phone, to our computer and vice-versa.
   a. What are the characteristics of IoT?
   b. What is the IoT Layered Architecture?
   c. Define IOT Hardware platforms, and mention 3 of them in details?
   d. What are the differences between SoC and Microcontroller?
   e. What is the function of JTAG in Intel Quark SoC X1000?

2. [*30 Points*] JavaScript is a cross-platform, object-oriented scripting language. It is a small and lightweight language.
   a. What are the Advantages of JavaScript?
   b. What is the difference between JavaScript and Jscript?
   c. What would be the output of the following statements?

```
var object1 = { same: 'same' };
var object2 = { same: 'same' };
console.log(object1 === object2);
```

3. [*30 Points*] In HIL simulation, you use a real-time computer as a virtual representation of your plant model and a real version of your controller.
   a. Why perform Hardware-In-Loop simulation?
   b. What is the difference between Validation and Verification?
   c. Define the SIL (software-in-loop)?
   d. Explain in brief the HIL test system components, as in Fig. 1?

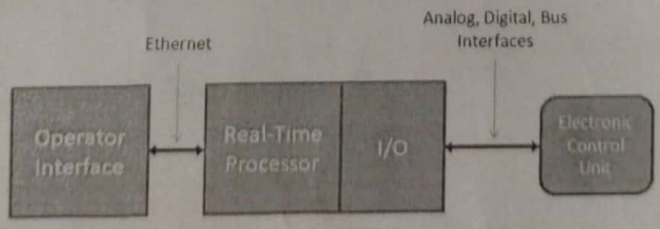

Fig. 1

4. [*30 Points*] Magnetic levitation system is an experiment in which a steel ball is levitated using the force generated by an electromagnet. The "maglev" system consists of an electromagnet, a ball rest, a ball position sensor, and a steel ball.

   a. Indicate why each of the following are needed in relation to Control Systems

      Modeling, Operating point, Simulink, and Step response

   b. Find the Simulink model of the magnetic levitation system shown in Fig. 2. Also, Define and write all the requirements to calculate and compute the following terms using MATLAB.

      i. Gain crossover frequency
      ii. Phase crossover frequency,
      iii. Gain margin,
      iv. Phase margin,
      v. Bandwidth,
      vi. Settling time,
      vii. Rise time,
      viii. Steady state error.

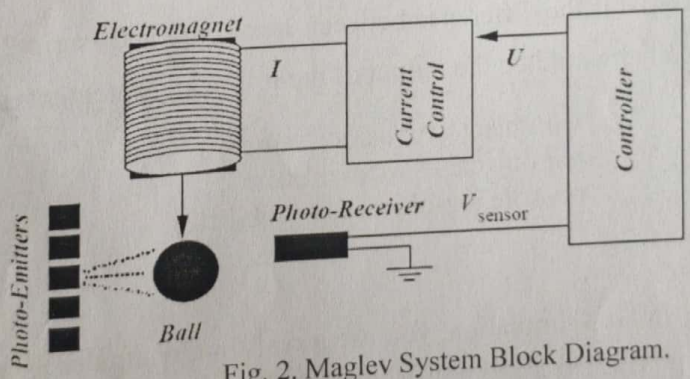

Fig. 2. Maglev System Block Diagram.

Good luck

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