ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
FACULTY OF ELECTRICAL AND COMPUTER ENGINEERING

TELEMETRY AND REMOTE CONTROL (TLMG1004)
MIDTERM 2019-2T – 27/Nov/2019

Student: ID:

I, the undersigned, hereby declare that I agree to fulfill as a student the Ethics Code from ESPOL, regarding the "Behavior of the Polytechnic Community" in all its articles. Otherwise, I will accept the sanctions that ESPOL may have on me.

Signature:

CHOOSE THE OPTION THAT FITS THE BEST.

1) Which one of the following fits better according to the virtual sensor definition?

   a) Virtual sensors provide a direct measurement based on realistic conditions (that, by themselves, are sort of ideal) by combining sensed data from a group of heterogeneous physical sensors.
   b) Virtual sensors provide a direct measurement based on ideal conditions (that, by themselves, are not realistic) by combining sensed data from a group of heterogeneous physical sensors.
   c) Virtual sensors provide a direct measurement based on realistic conditions (that, by themselves, are not abstract) by combining sensed data from a group of heterogeneous physical sensors.
   d) Virtual sensors provide indirect measurements of abstract conditions (that, by themselves, are not physically measurable) by combining sensed data from a group of heterogeneous physical sensors.

   Chosen option: ___

2) Low Power Wide Area Network technologies typically operates at

   a) 1400-1600 dB
   b) 140-160 dB
   c) 14-16 dB
   d) 1.4-1.6 dB
   Chosen option: ___

3) Which could be considered as challenges for the smart devices when transmitting by LPWAN technologies?

   a) Energy consumption.
   b) Vulnerabilities to their security.
   c) Components upgrading.
   d) All of them, in different levels, could be considered challenges.
   Chosen option: ___

4) Using LoRa WAN technology is possible to attain (theoretically and without any shortcomings) coverage distances of

   a) 1 Km
   b) 10 Km
   c) 100 Km
   d) 1000 Km
   Chosen option: ___

5) Two disadvantages of the sleep mode in electronic devices oriented to networking and industry are

   a) The random access memory (RAM) uses very little battery power,
   b) Battery can still drain slowly over the course of hours or days in Sleep Mode.
   c) Computer's RAM never gets a break and can become full or overloaded.
   d) Simple to restart
   Chosen option: ___

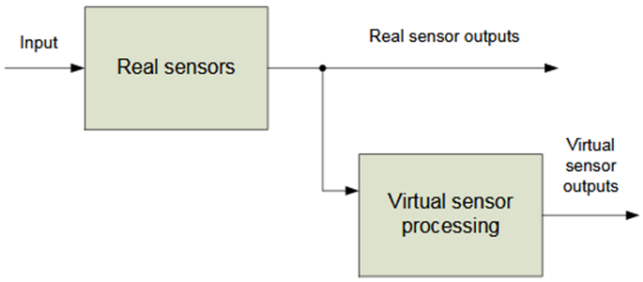
FOR THE FOLLOWING QUESTIONS, PROVIDE AN EXPLANATION BASED ON TECHNICAL ASPECTS

6) It is important to consider the Fresnel zone when implementing a telemetry system.
   a. Can we experience a shortcoming due to the beam width of the high frequency antennas?
   b. What happens to the phase in even and odd Fresnel zones?
   c. Is there any constraints when calculating it at indoor environments?

7) How is the signal strength related to the receiver sensitivity?

8) Describe how the noise floor affects the Low Power Wide Area Network (LPWAN).

9) What is the need to use a transfer function as part of the virtual sensor processing?



10) Briefly explain the characteristics of a piezoelectric transducer. Mention at least one application.

11) Explain the two types of control (both supervisory and control) when measuring a parameter through a sensor network, addressing their advantages and limitations.

12) Explain only one virtual sensor configuration (e.g., one-to-one, many-to-one, many-to-any, derived) **AND** include a case study in your answer?

13) What would happen if the signal conditioning is removed from the basic transducer block diagram?