**EE 101 Engineering Orientation 15.11.2021**

**2021 – 2022 Midterm Exam**

**Q1) by Oğuzhan Çiftdalöz**

Consider a car of mass $m$ with horizontal force $u$ (due to the engine) and aerodynamic drag force $βv^{2}$.



1. Write down the nonlinear diﬀerential equation which relates the velocity $v$ to the input force $u$.
2. If the car is travelling at a given constant velocity $v\_{o}$, compute the required force applied by the engine.

Q2) **by Yahya Kemal Baykal**

 Write 5 different types of signals that can be transmitted in a telecommunication system.

Q3 ) **by Göker Şener**

1. Which of the followings is TRUE for insulators ?

a-) They have many free electrons.

b-) Metals are insulators.

c-) Electrons can be separated and move easily.

d-) Electrons are tightly bound to the atomic core.

1. For the same conductivity constant (σ), which of the followings has the most resistance ?

a-) A wire with large cross sectional area.

b-) A wire with long length.

c-) A wire with small length.

d-) None of the above.

1. Which of the following electrical devices consumes the most power under the same constant voltage ?

 a-) 10 Ω b-) 50 Ω c-) 100 Ω d-) 1000 Ω

1. Which of the followings is NOT a reason for using “AC” in electrical energy usage ?

a-) Easy to generate.

b-) Possible to use transformers.

c-) Possible to use ground.

d-) Installation costs are lower.

1. Which of the followings is NOT true for a transformer ?

 a-) It can decrease the amplitude of the voltage/current.

b-) It has two windings (primary and secondary).

c-) It can increase the amplitude of the voltage/current.

d-) It can work with DC and AC.

Q4) by **Barbaros Preveze**

What is the name of the operation to pass signal through a System? and What is Sampling used for?

SOLUTIONS

**Q1**

a)

$$m\dot{v}=u-βv^{2}$$

b) Since$ v=v\_{o}=constant$, $\dot{v}=0.$ So,

$$0=-\frac{β}{m}v\_{o}^{2}+\frac{1}{m}u → u=βv\_{o}^{2}$$

**Q2)** 1D, 2B, 3A, 4C, 5D

**Q3)**

Voice

Data

Image

Video

Text

Combination (Multimedia)

Q4)

The name of the operation to pass signal through a System is “Convolution” .

Signal is sampled to convert an analog signal into its digital form?