Unit 14 - Analogous Systems

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-23, 23:59 IST.

1) For the system governed by the set of equations ***2 points***

$$\frac{dx_1}{dt} = 2x_1 + x_2 + u$$

$$\frac{dx_2}{dt} = -2x_1 + u$$

$$y = 3x_1$$

The transfer function $\frac{Y(s)}{U(s)}$ is :

- $\frac{3(s+1)}{s^2-2s+2}$
- $\frac{3(s+1)}{s^2+2s+2}$
- $\frac{3(s-1)}{s^2-2s+2}$
- $\frac{3(s)}{s^2-2s+2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{3(s+1)}{s^2-2s+2}$

2) Under mechanical rotational system and electrical system, the quantities that are not analogous are ***2 points***

- Angular velocity and current
- Angular displacement and charge
- Viscous friction and coefficient resistance
- Moment of inertia and conductance

No, the answer is incorrect.
Score: 0

Accepted Answers:
Moment of inertia and conductance

3) Consider reciprocal of capacitance and torsional spring stiffness as analogous quantities. The system is considered as ***2 points***

- Torque - voltage
- Torque - current
- Force - voltage
- Force – current

No, the answer is incorrect.
Score: 0

Accepted Answers:
Torque - voltage

4) The relationship between the force f(t) and the displacement x(t) of a spring-mass system (with mass M, viscous damping D, and spring constant K) ***2 points***
is

$$M\frac{d^2x(t)}{dt^2} + D\frac{dx(t)}{dt} + Kx(t) = f(t)$$

X(s) and F(s) are the Laplace Transform of x(t) and f(t) respectively. With M=0.1, D=2, K=10 in appropriate units, the transfer function $G(s) = \frac{X(s)}{F(s)}$ is

- $\frac{10}{s^2+20s+100}$
- $\frac{20}{s^2+20s+100}$
- $\frac{10}{s^3+20s+100}$
- $\frac{10}{s^2+10s+100}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{10}{s^2+20s+100}$

5) Force balancing equation of a mass element is (where, x = displacement) ***2 points***

- $M\frac{d^2x}{dt^2}$
- $M\frac{dx}{dt}$
- Mx
- Any of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
$M\frac{d^2x}{dt^2}$