



Universiti
Malaysia
PAHANG

Engineering • Technology • Creativity

**FACULTY OF MECHANICAL ENGINEERING
MIDTERM EXAMINATION**

COURSE	:	AUTOMATIC CONTROL
COURSE CODE	:	BHA 3233
LECTURER	:	MOHD AZRI HIZAMI RASID
DATE	:	APRIL 2017
DURATION	:	2 HOURS
SESSION/SEMESTER	:	SESSION 2016/2017 SEMESTER II
PROGRAM CODE	:	BHA

INSTRUCTIONS TO CANDIDATE:

1. This examination paper consists of **FOUR (4)** questions. Answer **ALL** questions
2. All answers to a new question should start on a new page.
3. All calculations and assumptions must be clearly stated.
4. Candidates are not allowed to bring any material other than those allowed by the invigilator into the examination room.

EXAMINATION REQUIREMENTS:

None

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of **FIVE (5)** printed pages including the front page.

QUESTION 1 [25 Marks]

Consider a part of a process industry, consisting of a valve and a tank. The system is described by Figure Q1 and the following information:

- The valve is operated electrically, and the input voltage is denoted u . The resulting liquid flow is denoted x .
- The level in the tank is denoted y , and the flow out from the tank, v , is determined by a pump located further down the process.
- The pipes are always filled with incompressible liquid, so there are no transport delays in the system. The system maintains the liquid level in the tank.

Draw the block diagram for the system.

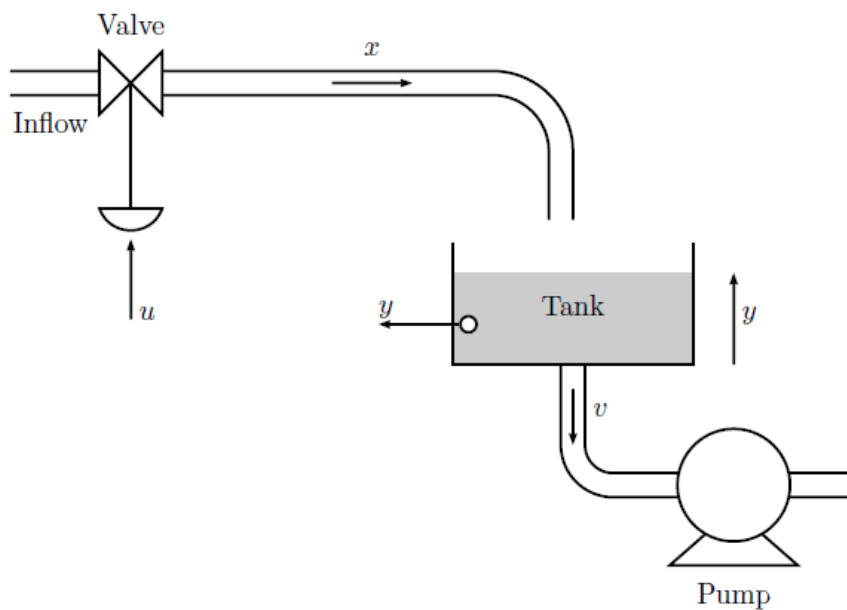


Figure Q1

QUESTION 2 [25 Marks]

Develop the transfer function $G(s) = X_3(s)/F(s)$ for the translational system below.

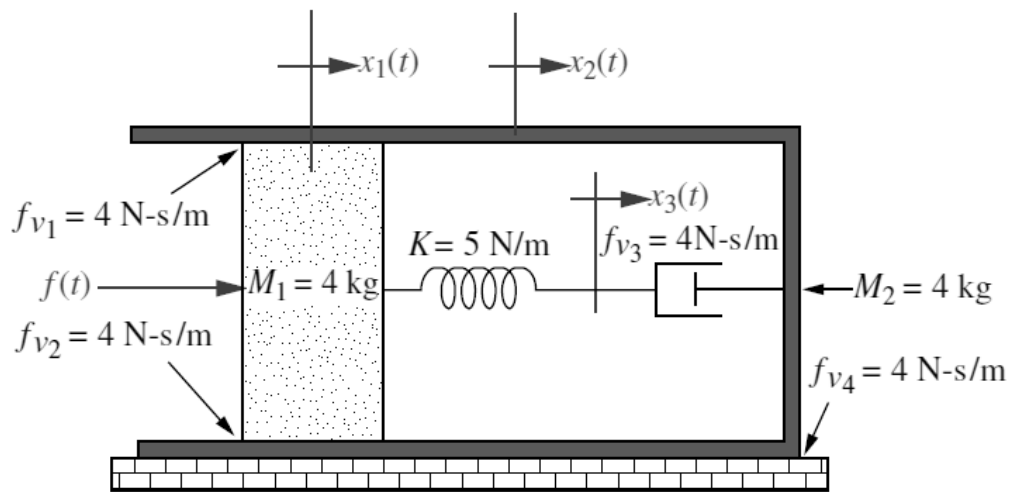


Figure Q2

QUESTION 3 [25 Marks]

Develop the transfer function, $G(s) = \theta_4(s)/T(s)$ for the rotational system below.

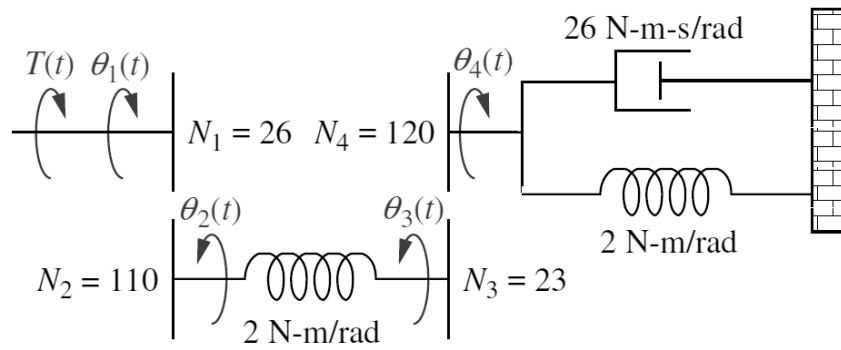


Figure Q3

QUESTION 4 [25 Marks]

Determine the transfer function $G(s) = C(s)/R(s)$ of the following system.

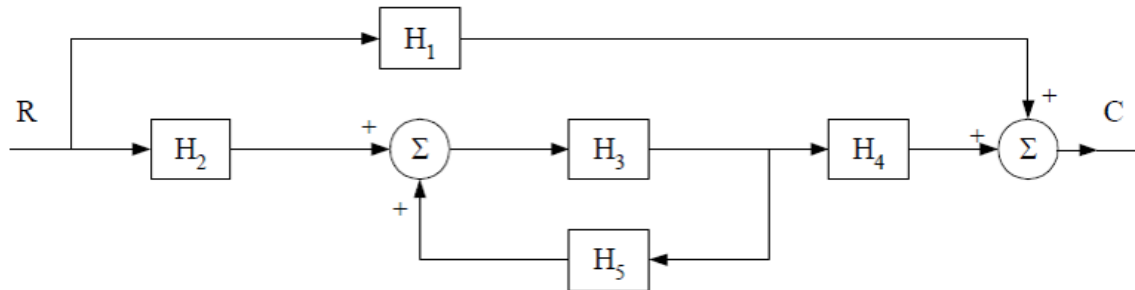


Figure Q4

END OF EXAMINATION PAPER