

# VETTING OF ONLINE OPEN EXAMINATION QUESTIONS

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## VETTING – Why?

- **Fulfilling University**
  - ISO
  - Academic rules and regulations
- **Accreditation Requirement**
  - Quality Management System
  - Alignment of Assessment to CLO
  - Fulfilment of Taxonomy requirements

## COMMON ISSUES – Things to look for..

- Wrongful focus
- Inappropriate choice of Taxonomy verbs not reflecting CLO
- Misguided questions
- Mismatch between mark allocation and answer schemes.

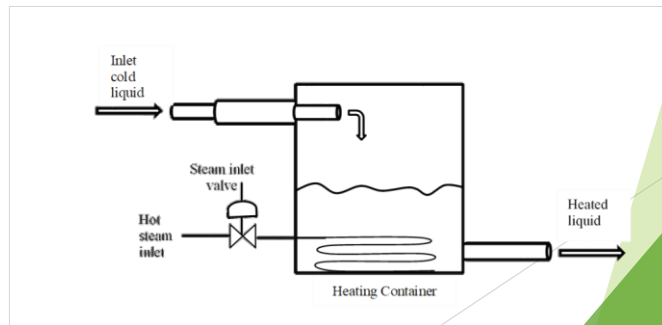
## THE VETTING PROCESS..

- Vetting form
  - CLO mapping
  - Level of difficulty
  - Marks allocation
  - Clarity of Questions
  - Answer scheme

## Example 1

Figure 1 shows an example of a heating process control applied in the industry. The inlet cold liquid stream is to be heated to certain temperature before discharges to the next process. A hot steam inlet provides the heating required.

Suggest improvements to the system that would convert the current heating process into closed loop control system.



## Example 1

Note:

Construct the open loop block diagram.

Construct the closed loop block diagram of the upgraded system

Re-sketch the figure and highlight additional elements added.

(10 marks)

## Example 2

The world today is continuously striving towards carbon neutral clean energy technology. Hence, renewable energy sources like wind power system is increasingly receiving the attention of mankind. Your company is planning to produce a wind turbine electricity generators blades. The blade size should be of 20 to 60 m in length, with complex aerofoil contours, minimum weight, very low maintenance, operated outdoor (expose to sun, rain, hail, storms, heat, cold dust, impact) with expected life time of more than 20 years.

Propose the most suitable material for the wind turbine blade.

[Note: Show the materials index performance and design requirement in your answer. Your evaluated candidates should include at least three materials.

## Example 3

Figure 5 shows block diagram of a control system. It represents position control of a CNC milling machine positioning table. A position controller,  $G_c(s)$  is to be design fulfilling the following performance criteria:

- i. A percentage overshoot of just 5% for a step input.
- ii. An improvement of 50% from the current system settling time.

In complex plane, the dominant second order pair of poles for the uncompensated system is located at  $-3.35 + 3.51j$  while in frequency domain, the static error constant must equals 40 to meet the steady-state error requirement.

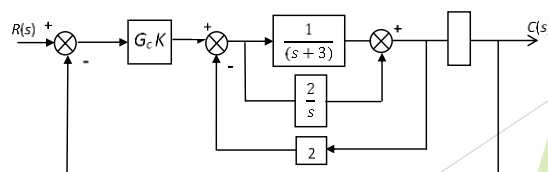


Figure 5: Block diagram of a control system with gain  $K$

## Example 3

- (a) Solve for the gain  $K$  that would meet the respective system requirement. (4 marks)
- (b) Design a position controller,  $G_c(s)$  that meets the system response requirements using **either a Root Locus method or a Frequency Response method**.

[Note: The open loop Bode diagram of the system is shown in Figure 6]

(12 marks)

## Example 4

Design a robotic-based cell in a manufacturing application.

Pick and application in Manufacturing whereby a specific task is being handled by a robotic system.

Note:

- ✓ Name the selected process.
- ✓ Select the best robot configuration (Cartesian, Cylindrical, Spherical, Articulate) for the task selected.
- ✓ Select from literature (not textbook), an industrial-apply robot manipulator suitable for the task and configuration selected.
- ✓ Construct the D-H representative for the robot manipulator selected (indicate/assign all dimensions as necessary with proper labeling).
- ✓ Perform D-H analysis by constructing the DH Parameter Table.
- ✓ Solve for the overall transformation matrix of the robot structure (use any available numerical software to assist you) by assigning numerical values to all respective angles.

Terima Kasih..

