Internal Assessment (Grade 10, Term 1)
AY 2024-25

Electro Mechanical Production

Grade	10
Type of task	Online Simulation based
Taster Course	Electro Mechanical Production
Unit number/ Title	Unit 1- Controller & Unit 3- Sensors & Actuators
Objective of the task	Developing a working simulation of a Water Overflow Detection System and demonstrating its functionality. The objective is to encourage students to apply their knowledge of sensors, microcontrollers, and basic circuit design to create a system that monitors water levels in real time using an ultrasonic sensor. The model should be capable of triggering a buzzer to alert users when the water level reaches the maximum overflow point, showcasing their ability to solve practical problems creatively and efficiently.

Task description	The teacher will divide students into groups and guide them in understanding the principles of sensors, microcontrollers, and circuit design. Students will discuss how an ultrasonic sensor can monitor water levels in real-time and how a buzzer can be triggered when the water reaches the maximum overflow point. Each group will be appointed a task to construct a Water Overflow Detection System that demonstrates these principles and effectively addresses the issue of water overflow. The groups will use chart paper to present their work, explaining the design, functionality, and working principles of their system, along with their insights and problem-solving approach.
1. Instructions for students	You have been observing in your society that there is significant wastage of water due to the overflow of water tanks, as there are no systems to indicate when the water level has reached its maximum point. To address this issue, create an online simulation of a Water Overflow Detection System using your knowledge of sensors, microcontrollers, and circuit design. The simulation should monitor water levels in real time using an ultrasonic sensor and trigger a buzzer when the maximum water level is reached. Develop an online simulation of a Water Overflow Detection System that demonstrates your understanding of sensors and circuits. Alongside the simulation, present your work using a chart or presentation explaining your design, working principles, how the system functions, and the importance of preventing water overflow.

2. Instruction for teachers	• Create groups of students with around 6-7 students in 1 group. Keep the group a mix of students with higher average and lower learning levels. • Discuss design consideration: explain the key design considerations they should: easy and efficient design. Highlight the significance of using that design and how it relates to energy saving concepts • Ask the following questions separately to each student: • What design considerations have they made? (Knowledge and understanding) • How is buzzer is turning on with specific water level (Critical thinking) • For students, who have not spoken ask them separately to explain the simulation (Communication)
3. Resources required	**Students:** Arduino board, ultrasonic sensor, buzzer, connecting wires, breadboard and a computer with simulation software (TinkerCAD). **Teachers:** Instructions for using simulation software, question paper, and rubric for assessment.

4. Assessment criteria	**Criteria A: Knowledge and Understanding (Max. score point-8)** ● Recognize and list relevant concepts, vocabulary and topics. ● Understanding the concept of sensors, controllers and programming clarity in student. ● Understanding of the concept of water saving ideas. ● Student model depicts how different components are interconnected to achieve the solution. **Criteria B: Communication (Max. score point-8)** ● Assess the presentation's clarity. ● How well the student has structured the presentation, used charts and PPTs, and ensured that information is presented in a logical and coherent manner. ● The use of visuals, diagrams in the chart. **Criteria C: Creative Thinking (Max. score point-8)** ● The creativity and innovation displayed in the simulation. ● How well the student has explored unconventional or imaginative approaches. **Criteria D: Critical Thinking (Max. score point-8)** ● The student's ability to identify and analyse potential challenges in the online simulation. ● Assess their approach to testing the effectiveness of the overflow detector. ● Readiness to make necessary adjustments. ● Consider their ability to reflect on the simulation and discuss lessons learned.

Task assessment criteria (RUBRIC) –

The task will be assessed on the below listed criteria

Score point/Criterion	**1-2**	**3-4**	**5-6**	**7-8**
A: Knowledge and Understanding	• Lacks understanding of at least 2 among Sensors, controllers, programming & clarity on simulation. • Lacks understanding of the concept of water conserving ideas. • Not able to explain how different components are interconnected to achieve the solution	• Students were somewhat able to explain at least 2 among Sensors, controllers, programming & clarity on simulation. • Understanding of the concept of water conservation ideas somewhat clear • Somewhat able to explain how different components are interconnected to achieve the solution	• Clear understanding of at least 2 among Sensors, controllers, programming & clarity on simulation. • Understanding of the concept of water saving ideas. • Able to explain how different components are interconnected to achieve the solution	• Clear understanding of Sensors, controllers, programming & clarity on simulation. • Understanding of the concept of water saving ideas. • Student model depicts how different components are interconnected to achieve the solution.

B: Communication	• Presentation lacks clarity and organization • Presentation lacks structure and students were not able to put the right information across	• Presentation is somewhat clear and organized • Presentation lacks structure but students were able to put the information across	• Presentation is almost clear, organised and readable • Students have been able to give a structure to the presentation with some headings. information presented should be true	• Presentation contains clarity, organisation, and readability. • Students have structured the Presentation with use of proper headings and subheadings, and ensured that information
C: Creative Thinking	• Minimal use of connecting wires & cleanly simulation • No innovation and creativity displayed • No Imaginative approaches	• The model lacks use of connecting wires & cleanly simulation • The design lacks innovation and creativity • Lack of Imaginative approaches	• Somewhat used resources, such as connecting wires & cleanly simulation to achieve the project's goals. • The design somewhat has innovation and creativity displayed • Student's imagination is somewhat visible	• Use of resources, such as connecting wires & cleanly simulation, to achieve the project's goals. • The design has innovation and creativity displayed • Imaginative approaches are being followed

D: Critical Thinking	• Students could hardly present challenges and potential • Students were not able to assess their approach critically to test the working of water overflow detector.	• Students lacked ability to identify and analyse Potential challenges in the simulation. • Students lacked the ability to critically assess their approach to testing the working of water overflow detector.	• Students were somewhat able to identify and analyse potential challenges in the simulation. • Students were somewhat able to Critically assess their approach to testing the working of water overflow detector.	• Students were able to identify and analyse potential challenges in the simulation. • Students were able to critically assess their approach to testing the working of water overflow detector.