

FACULTY: Engineering & the Built Environment

DEPARTMENT	DEPARTMENT OF ELECTRICAL, ELECTRONIC & COMPUTER ENGINEERING			SEMESTER	1(2026)
QUALIFICATION (S)	BACHELOR OF ENGINEERING TECHNOLOGY (ELECTRICAL ENGINEERING)			CODE (S)	BPETEE
SUBJECT (S)	CONTROL SYSTEMS 3			CODE (S)	CSS370S
NO OF PAGES (including cover page)	5	DATE	02 FEBRUARY 2026	TIME	
ANNEXURE (S) (Y/N)	NONE			DURATION	8/12 WEEKS
COLOUR IMAGES (Y/N)	N/A				
EXAMINER NAME	DR N DUBE				
INTERNAL MODERATOR	DR C. KRIGER				
EXTERNAL MODERATOR	DR. N. MKONDWENI				

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INSTRUCTIONS (students, invigilators, etc)

PLEASE REFER TO INSTRUCTIONS IN THE QUESTION PAPER.
PLEASE READ WITH CARE & UNDERSTANDING!!!

REQUIREMENTS (e.g. 2 answer books, etc)

- Only pens with permanent ink may be used when answering questions.
- Pencils may be used in instances where diagrams and sketches are required.

FOR STUDENT IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

- Answer All questions and in sequence.
- Open book assessment.
- Graduate Attribute (GA): Indicate which question measures the GA.

PLEASE PAY ATTENTION TO THE INSTRUCTIONS!!!

SECTION A: SUBMISSION INSTRUCTIONS

1. THE PROJECT SUBMISSION IS **SEPARATED INTO TWO PARTS**:
 - [1] **LABORATORY PRESENTATIONS** WHICH WILL RUN FROM **08 JUNE (GROUP A) UNTIL 19 JUNE (GROUP E)**. THE LIST WILL BE SHARED LATER ONLINE!!!
 - [2] IF YOU ARE ABLE TO PRESENT BEFORE THE SET DATE, INDICATE POSSIBILITY FOR EARLIER PRESENTATION DATE.
 - [3] **FINAL REPORT SUBMISSION**, SEE DETAILS FROM POINT 2. BELOW AND FURTHER. 50% OVERALL MARK
2. THE PRACTICAL EVALUATION COUNTS 50% OF THE PROJECT AND THE REPORT ALSO 50% OF THE PROJECT FINAL MARK.
3. IF A STUDENT IS NOT ABLE TO DEMONSTRATE THE FINAL WORKING PROJECT PLEASE USE SIMULATION TO GET RESULT SO AS TO COMPLETE THE DOCUMENT PART OF THE PROJECT (**THIS MEANS YOU WILL BE MARKED ONLY OUT OF 50%**)
4. DOCUMENTS (**PDF FORMAT ONLY**) WILL BE SUBMITTED **ONLINE** ON OR BEFORE **FRIDAY JUNE 19, 23:30PM**.
5. TRY AND SUBMIT **NOT TOO CLOSE TO THE CLOSING TIME**, EVEN IF YOUR PROJECT IS NOT COMPLETE!
6. PLEASE KEEP THE DOCUMENT **AS PROFESSIONAL AS POSSIBLE** (WORK UNDERLINED BY FREEHAND & UNTIDY PAGES WILL NOT BE CONSIDERED). **NO CIRCUIT PHONE IMAGES** SHOULD BE INCLUDED, ONLY CIRCUIT DIAGRAMS FOR DETAILED EXPLANATIONS.
7. DOCUMENT PAGES SHOULD BE AS FOLLOWS (The skeletal document structure is shown below):

SAVE UNDER FILENAME: Surname_Initials_StudentNumber_GA1_Project_2025

 - 1) Cover Page (Your details)
 - 2) Project Description page (Only the first description page) OPTIONAL
 - 3) Your solutions (The Introduction, and Part 1 to 3 Report pages provided, and conclusion page) provided as separate documents and in Appendices in this document
 - 4) A template will be provided ONLINE.
 - 5) References (where applicable)
 - 6) Appendices (where applicable)
8. ONCE THE DOCUMENT HAS BEEN FULLY COMPILED, CONVERT INTO PDF FORMAT AND SUBMIT USING THE PROVIDED LINK ON MYCLASSROOM LMS SYSTEM (BB).

You must ENJOY what you are doing, otherwise the project will seem too complicated!!!

SECTION B: AUTOMATED PARKADE CONTROL SIMULATION

NOTE: The project will run over 8/12 weeks.

1. Design a control system using any practical electronic COMPONENTS to demonstrate a vehicle cruise control system based on the system in **Figure 1**, below. No microcontroller nor PLC's solution. Please use ELECTRONIC circuits/components.
2. It is general understanding that in Engineering Design, we build each stage of the project individually and should be tested individually before assembling the full circuit.
3. Students are to work independently during Practical Sessions. Please make sure to attend. NO EXCUSES.
4. Students must use their own insights in terms of relevant circuits and design procedure to follow. **NB:** It is important to demonstrate engineering skills that have been acquired in all the earlier years of study, and not every little aspect will be explained to students, you must apply your mind.
5. The lecturer will avail himself in the laboratories to offer guidance to students and help where necessary during Practical/Laboratory Sessions. Please use this time fruitfully.
6. Be able to clearly indicate each stage of the circuit independently.
7. Our starting point might just be as well to produce an analog sensor circuit that will be able to produce an output between 0V and 1V, for any relevant VCC value chosen.
8. Be able to reset cruise value at any point. **NOTE:** This is not a RESET BUTTON!!!
9. For speeds from 0 to 5, a GREEN indicator must be ON, numbers between 6 and 9 (depending on the chosen cruise speed value) AMBER indicator, and when the cruise speed is reached use FLASHING RED indicator.
10. The maximum speed is 10, we should be able to show the max speed. Flashing RED colour should continue until the maximum speed.
11. Amplifier circuits should never have a gain more than 5; alternatively, use multi-stage amplifiers for gains above 5. **Hint:** Also, use buffer circuit between amplifier stages.

NOTE: There is a **lot of thinking necessary** in this project but work on stage by stage.

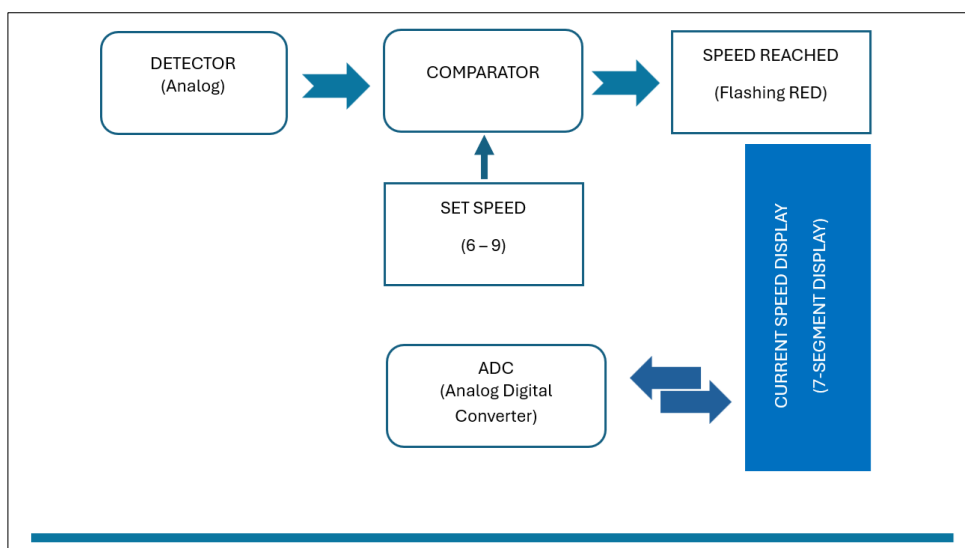


Figure 1: Automated cruise speed control system.

1. The sooner you get started with the design concept, the better.
2. Laboratory sessions should be for testing rather than brainstorming of ideas.
3. Brainstorm ideas should be done in the week before the practical day.

SECTION C: POTENTIAL ENGINEERING DESIGN STAGES

1. Analog circuitry (detector circuit)
2. Comparator circuitry for different values (you may need more than one comparator)
3. Amplifier gain circuit
4. Analog to Digital converter circuit
5. Multiplexer circuit where necessary
6. Counter circuit with two displays
7. Flashing circuit (triggered by a certain value)
8. ADD and SUBTRACTOR circuitry

NOTE: Some adjustments maybe made; this is just a guide for starters.

SECTION D: EVALUATION CRITERIA

GA1: Problem Solving**Subject & code:**

Student Name and Number:

	1 (0-25%)	2 (26-49%)	3 (50-75%)	4 (76-100%)	Assessor's Rating	Student Score (%)
INDICATORS & WEIGHTING	Needs work	Developing	Competent	Strong		
1. Identify/Define Broadly Defined Problem: Ability to identify and/or articulate a Broadly Defined Problem. (25%)	Demonstrates minimal or no ability to identify/articulate a BROADLY DEFINED problem.	Demonstrates some ability to identify/articulate a BROADLY DEFINED problem that is partially connected to the issues at hand.	Demonstrates ability to identify/articulate a BROADLY DEFINED problem that is clearly linked to the issues at hand.	Demonstrates a skilful ability to identify/articulate a BROADLY DEFINED problem that is strongly supported and clearly linked to the issues at hand.		
2. Formulate Strategies for Solving a BROADLY DEFINED problem: Ability to identify strategies for solving Broadly Defined problems. (25%)	Demonstrates minimal or no ability to identify a strategy for generating an approach for solving a BROADLY DEFINED problem.	Demonstrates some ability to identify a strategy for generating an approach for solving the BROADLY DEFINED problem. Strategy may or may not be appropriate.	Demonstrates an ability to identify an appropriate strategy for generating approaches for solving a BROADLY DEFINED problem.	Demonstrates a skilful ability to identify multiple strategies for generating approaches to solve a BROADLY DEFINED problem and has insight into the pros and cons of those strategies.		
3. Analyse, Evaluate and Select Solutions: Ability to analyse, evaluate and select optimal/practical solution. (25%)	Demonstrates minimal or no ability to analyse, evaluate or select optimal/practical solution.	Demonstrates some ability to analyse, evaluate and select optimal/practical solution.	Ability to create/play with new solutions.	Demonstrates a skilful ability to analysis, evaluate and select optimal/practical solution.		
4. Implement Solutions: Ability to implement a practical solution to address the BROADLY DEFINED problem. (25%)	Demonstrates minimal or no ability to implement a practical solution.	Demonstrates some ability to implement a practical solution.	Demonstrates an ability to analyse, evaluate and select optimal/practical solution.	Demonstrates a skilful ability to implement a practical solution.		
					Final Mark (%)	
Examiner:						
Internal moderator:						
External moderator:						