University of Technology, Sydney

Faculty of Engineering and Information Technology

Subject: **48540 Signals and Systems**

Assessment Number: **6**

Assessment Title: **Group Project**

Tutorial Group:

Students Name(s) and Number(s)

Student Number	Family Name	First Name

Declaration of Originality:

The work contained in this assignment, other than that specifically attributed to another source, is that of the author(s). It is recognised that, should this declaration be found to be false, disciplinary action could be taken and the assignments of all students involved will be given zero marks. In the statement below, I have indicated the extent to which I have collaborated with other students, whom I have named.

Statement of Collaboration:

Signature(s)

Project Letter

The Group Project report is due on the date specified in the Learning Guide.

Reports must be handed in to the subject coordinator.

Project Letter

Group Project – Marking Scheme

Students Name(s) and Number(s)

Student Number	Family Name	First Name

The content of your project report has been assessed according to the following criteria:

G = all relevant material presented in a logical manner showing clear understanding, full explanations of analysis and reasons for choices and decisions in a design
A = most relevant material presented with acceptable organisation and understanding
P = little relevant material presented and/or poor organisation or understanding

Group Project – Total Marks

/4	**Lab 6**
/8	**Digital Controller**
/8	**Demodulator Design**
/20	**TOTAL**

Lab 6 – Maze Rover Modelling

Mark	Grade	Item	Comments
/1	**G A P**	Step response.	Measurement of step response: K, T.
/1	**G A P**	Frequency response.	Measurement of frequency response: ω_0 and DC (low freq) gain.
/1	**G A P**	Transfer function.	Description of how it was derived from step or frequency response.
/1	**G A P**	MATLAB® response verification.	Theoretical and experimental magnitude and phase response plotted together. Shows close fit, low frequency gain and ω_0. Theoretical and experimental step response plotted together. Shows close fit, steady-state value and time constant.
/4		**SUBTOTAL**	

Group Project – Digital Controller

Mark	Grade	Item	Comments
/1	G A P	Desired poles.	Specification regions defined and drawn in the *s*-plane.
/1	G A P	State-variables.	Designed using matrix algebra, and then confirmed using block diagram reduction.
/1	G A P	Root-locus.	Screen shot of MATLAB® with RLTOOL. Investigation of 10% variation of MR pole location.
/1	G A P	Minor-loop.	Design by block diagram reduction.
/1	G A P	MATLAB® continuous-time step response simulation.	Continuous-time step response for all three schemes, showing actual peak time, P.O. and settling time.
/1	G A P	MATLAB® discrete-time step response simulation.	Discrete-time step response for all three schemes, showing actual peak time, P.O. and settling time. Effect of coefficient round-off and bilinear transformation.
/2	G A P	Lab verification.	A plot of experimental results, for each scheme, verifying that they meet the control specifications, and lab mark attached.
/8		**SUBTOTAL**	

Group Project – Demodulator Design

Mark	Grade	Item	Comments
/1	G A P	VCO characteristic.	Graph of f_i vs. DC input voltage. Values for f_o and k_v determined.
/1	G A P	Phase detector filter design.	Design of filter based on criterion.
/1	G A P	Loop filter design.	Design of filter based on criterion. Design of phase-shifter.
/1	G A P	Modulated spectra.	Identification of modulation scheme and f_c based on experimental results (magnitude spectra and time-domain waveforms).
/1	G A P	Demodulator design.	Theoretical design of demodulator, showing spectra at each point. Includes all frequencies, phases, gains and cutoff frequencies.
/1	G A P	Demodulator filter design.	Design of comb-resonator filter. MATLAB® simulation of demodulator.
/2	G A P	Lab verification.	A plot of experimental results when transmitting both messages, verifying that the demodulation scheme works, and lab mark attached.
/8		**SUBTOTAL**	