La Trobe University
Department of Electronic Engineering
ELE2EMI 2007
Assignment 4
Due: 2 pm, Monday 22 October 2007

You **must** complete, **sign** and **submit** the following **declaration** *with this assignment* in order to receive **any marks** for the assignment.

Name:	Student No:

DECLARATION

I certify that the attached assignment is my original work and that no part of it has been copied or reproduced from any other person's work without acknowledgement.

Signed:	Date:

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Question 1. (General Purpose Interface Bus)

(1) *State* three (3) **advantages** of **automated test equipment** (ATE).

(2) *Name* the four (4) **types** of **devices** in the **general purpose interface bus** (GPIB).

(3) A **minimal** GPIB system consists of which two (2) **types** of **devices**?

(4) *What* are the three (3) **functions** of a GPIB **controller**?

(5) *Give* the two (2) GPIB **data rates**, in kilobytes per second.

Question 2. (Noise)

(1) *How* does **pink** noise *differ* from **white** noise?

(2) *Define* **thermal noise**.

(3) *Calculate* the **effective thermal noise bandwidth** Δf of a 16 kΩ resistor with 4V RMS across its terminals at a temperature of 300 K. (*Hints*: P=4kT.Δf and V^2_{RMS}= PR and Boltzmann's constant k is given in the first chapter of the lecture notes.)

(4) **Electrically coupled** interference voltage increases with what four (4) quantities?

(5) What *causes* **shot** noise?

Question 3. (Grounding)

(1) *State* the international standard **colors** for the three (3) lines in an AC power cord.

(2) What is **leakage current**?

(3) *Name* two (2) likely effects on a *human* of a current in *excess* of 6A passing through the body.

(4) What is a **ground loop**?

(5) Give a possible *solution* to **crosstalk**.

Question 4. (Noise Measures, Shielding and Filtering)

(1) *Define* the **signal-to-noise ratio** (S/N).

(2) *Name* two (2) properties of **real amplifiers** that give rise to **distortion**.

(3) What is **hiss** noise?

(4) *What* might you use to *eliminate* the interference caused by the *50 Hz hum* from the mains power?

(5) If an **electric shield** has an opening in the shape of a *cylinder* with a *circumference* $2\pi r = 16$ cm and a *sleeve* of length $L = 80$ cm, then what is the **attenuation** (in dB) of an interference waveform of *wavelength* $\lambda = 10$ cm that enters that opening? (*Hint*: for this geometry, the attenuation = $4.5\,(L/\lambda_c)\,\sqrt{1-(\lambda_c/\lambda)^2}$ dB, where $\lambda_c = \pi r$.)

Author: Geoffrey Tobin: Tuesday 2 October 2007.

END.