Course: BTEC L3 Extended Diploma in Engineering / Diploma in Electrical / Electronic Engineering

Unit/s: 57: Principles and Applications of Analogue Electronics

Outcome/s: 1 Decibel and Noise

Grading criteria:
P1 Explain the decibel as a measure of gain and noise.
P7 Use computer-based simulation methods to simulate and test the performance of a given analogue electronic circuit.
P8 Build and test an electronic circuit to a given analogue specification.
M3 Evaluate the performance of an analogue circuit by interpreting measured results

Pass:  Merit:  Distinction:

Instructions:
- attempt all questions
- work to be legible and succinct, with an adequate grasp of grammar, punctuation and spelling
- calculators may be used but show working step by step
- ensure sketches & diagrams are clear, accurate & labelled
- true graphs, titled & axes labelled
- list sources where appropriate.

Student feedback:

Student declaration – The assignment attached is my own work
Signed:  Date:

Assessor feedback:

Internal verification (Before issue)  Issue date  Student hand in date  Internal verification (assessment decision)
RP 18/02/12
Grading Criteria

<table>
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<th>P1</th>
<th>Explain the decibel as a measure of gain and noise.</th>
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<td>P7</td>
<td>Use computer-based simulation methods to simulate and test the</td>
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<td>Build and test an electronic circuit to a given analogue specification.</td>
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<td>Evaluate the performance of an analogue circuit by interpreting</td>
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Assignment – Decibel and Noise

Using your class notes and any other suitable resources, attempt the following tasks. Show all of your workings and draw supporting circuit diagrams.

This practical and written assignment provides evidence for satisfaction of the Learning Outcomes P1, P7 and P8, and the opportunity to achieve M3. (The relevant grading criteria are given in brackets after each task)

1 Transistor Amplifier Simulation

Using a suitable circuit simulation package, capture the schematic of the circuit shown in figure 1. Provide the simulation analysis results for the voltage gain of the amplifier and determine the useful bandwidth of the amplifier. State the maximum voltage gain and the frequency at which this occurs for the circuit.

![Figure 1 - Class A Transistor Amplifier](image)
2 Transistor Amplifier Breadboard Design

Use the “breadboard” function of the simulation package to plan the construction of the circuit. Print out a view of the design layout from which you could construct the circuit.  

(P7)

3 Transistor Amplifier Construction and Testing

Construct the transistor amplifier. Taking suitable measurements, plot the voltage gain against frequency for the circuit. From your graph determine the bandwidth of the circuit and the voltage gain as a ratio and in decibels (dB) for the mid range frequency.  

(P1, P8)

4 Signal to Noise Ratio

Measure and record the peak to peak noise voltage at the output of the amplifier with no signal input. Input a signal that does not cause distortion in the output and measure and record the peak to peak output signal voltage.  

Determine the signal to noise ratio for your circuit.  

Clearly indicate all equations used and your step by step workings of all calculations.  

(P1)

5 Advantages of the Decibel

Explain the advantages of using the decibel to present gain and signal to noise ratio information.  

(P1)

6 Comparison of simulation and practical results

Compare and contrast the results of your circuit simulation and practical measurements. Explain any differences you find and support your points with reference to suitable theory.  

(M3)