

# Contents

<b>Preliminaries</b>	<b>7</b>
0.1 Introduction . . . . .	8
0.2 Definitions . . . . .	8
0.3 Significant Figures . . . . .	8
0.3.1 Rules for Significant Figures . . . . .	9
0.4 Mean Value . . . . .	9
0.5 Standard Deviation . . . . .	9
0.6 Percent Error . . . . .	10
0.7 Linear Regression-The Method of Least Squares . . . . .	10
0.8 The Greek Alphabet . . . . .	12
0.9 Important Formulae . . . . .	12
0.10 Important Constants and Relations . . . . .	13
<b>1 Introduction to Measurement</b>	<b>15</b>
1.1 Purpose . . . . .	15
1.2 Important Equipment . . . . .	15
1.3 Introduction . . . . .	15
1.4 Lab Activity . . . . .	15
1.4.1 Measurements . . . . .	15
1.4.2 Determining accuracy . . . . .	16
1.4.3 Determining an unknown . . . . .	16
<b>2 Measurement, Mass and Density</b>	<b>19</b>
2.1 Purpose . . . . .	19
2.2 Important Equipment . . . . .	19
2.3 Introduction . . . . .	19
2.4 Lab Activity . . . . .	20
<b>3 The Acceleration Due to Gravity</b>	<b>23</b>
3.1 Purpose . . . . .	23
3.2 Important Equipment . . . . .	23
3.3 Introduction . . . . .	23
3.4 Lab Activity . . . . .	24

<b>4</b>	<b>Forces in Static Equilibrium</b>	<b>27</b>
4.1	Purpose . . . . .	27
4.2	Important Equipment . . . . .	27
4.3	Introduction . . . . .	27
4.4	Lab Activity . . . . .	29
<b>5</b>	<b>The Ballistic Pendulum</b>	<b>33</b>
5.1	Purpose . . . . .	33
5.2	Important Equipment . . . . .	33
5.3	Introduction . . . . .	33
5.4	Lab Activity . . . . .	34
<b>6</b>	<b>Uniform Circular Motion</b>	<b>37</b>
6.1	Purpose . . . . .	37
6.2	Important Equipment . . . . .	37
6.3	Introduction . . . . .	37
6.4	Lab Activity . . . . .	38
<b>7</b>	<b>Friction</b>	<b>41</b>
7.1	Purpose . . . . .	41
7.2	Important Equipment . . . . .	41
7.3	Introduction . . . . .	41
7.4	Lab Activity . . . . .	42
<b>8</b>	<b>Torque</b>	<b>45</b>
8.1	Purpose . . . . .	45
8.2	Important Equipment . . . . .	45
8.3	Introduction . . . . .	45
8.4	Lab Activity . . . . .	46
<b>9</b>	<b>Simple Harmonic Motion</b>	<b>49</b>
9.1	Purpose . . . . .	49
9.2	Important Equipment . . . . .	49
9.3	Introduction . . . . .	49
9.4	Lab Activity . . . . .	51
<b>10</b>	<b>Air Column Resonance</b>	<b>55</b>
10.1	Purpose . . . . .	55
10.2	Important Equipment . . . . .	55
10.3	Introduction . . . . .	55
10.4	Lab Activity . . . . .	56
<b>11</b>	<b>Thermal Expansion</b>	<b>59</b>
11.1	Purpose . . . . .	59
11.2	Important Equipment . . . . .	59
11.3	Introduction . . . . .	59

<i>CONTENTS</i>	3
11.4 Lab Activity . . . . .	59
<b>12 Boyle's Law</b>	<b>63</b>
12.1 Purpose . . . . .	63
12.2 Important Equipment . . . . .	63
12.3 Introduction . . . . .	63
12.4 Lab Activity . . . . .	63
<b>13 Heat Capacity</b>	<b>67</b>
13.1 Purpose . . . . .	67
13.2 Important Equipment . . . . .	67
13.3 Introduction . . . . .	67
13.4 Lab Activity . . . . .	68
<b>14 Equipment of the Electric Circuits Lab</b>	<b>71</b>
14.1 Purpose . . . . .	71
14.2 Important Equipment . . . . .	71
14.3 Introduction . . . . .	71
14.4 Lab Activity . . . . .	73
<b>15 Potential Difference and Capacitance</b>	<b>77</b>
15.1 Purpose . . . . .	77
15.2 Important Equipment . . . . .	77
15.3 Introduction . . . . .	77
15.4 Lab Activity . . . . .	79
<b>16 Capacitors in Series and Parallel</b>	<b>81</b>
16.1 Purpose . . . . .	81
16.2 Important Equipment . . . . .	81
16.3 Introduction . . . . .	81
16.4 Lab Activity . . . . .	83
<b>17 Internal Resistance of Meters</b>	<b>87</b>
17.1 Purpose . . . . .	87
17.2 Important Equipment . . . . .	87
17.3 Introduction . . . . .	87
17.4 Lab Activity . . . . .	88
<b>18 Resistors and Ohm's Law</b>	<b>91</b>
18.1 Purpose . . . . .	91
18.2 Important Equipment . . . . .	91
18.3 Introduction . . . . .	91
18.4 Lab Activity . . . . .	92

<b>19 DC Circuits I</b>	<b>95</b>
19.1 Purpose . . . . .	95
19.2 Important Equipment . . . . .	95
19.3 Introduction . . . . .	95
19.4 Lab Activity . . . . .	97
<b>20 DC Circuits II</b>	<b>99</b>
20.1 Purpose . . . . .	99
20.2 Important Equipment . . . . .	99
20.3 Introduction . . . . .	99
20.4 Lab Activity . . . . .	102
<b>21 Magnetism</b>	<b>105</b>
21.1 Purpose . . . . .	105
21.2 Important Equipment . . . . .	105
21.3 Introduction . . . . .	105
21.4 Lab Activity . . . . .	106
<b>22 Converting Electrical Energy to Heat</b>	<b>109</b>
22.1 Purpose . . . . .	109
22.2 Important Equipment . . . . .	109
22.3 Introduction . . . . .	109
22.4 Lab Activity . . . . .	111
<b>23 Refraction: Snell's Law</b>	<b>113</b>
23.1 Purpose . . . . .	113
23.2 Important Equipment . . . . .	113
23.3 Introduction . . . . .	113
23.4 Lab Activity . . . . .	116
<b>24 Diffraction: Single and Double Slit Interference</b>	<b>119</b>
24.1 Purpose . . . . .	119
24.2 Important Equipment . . . . .	119
24.3 Introduction . . . . .	119
24.4 Lab Activity . . . . .	121
<b>25 The Diode</b>	<b>123</b>
25.1 Purpose . . . . .	123
25.2 Important Equipment . . . . .	123
25.3 Introduction . . . . .	123
25.4 Lab Activity . . . . .	126
<b>26 Radioactive Decay</b>	<b>129</b>
26.1 Purpose . . . . .	129
26.2 Important Equipment . . . . .	129
26.3 Introduction . . . . .	129

26.4 Lab Activity . . . . . 130

**Appendices** **133**

A Trigonometric Identities . . . . . 133

B Physical Constants . . . . . 134

C Relations Between Units . . . . . 135