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| --- |
| ***Instructions:***   * ***Submission must contain only original, individual, and current work.*** * ***After completion, save as PDF before submitting.*** |

## Task 9.6.1

Objective:

|  |
| --- |
| Inductor step response |

Circuit Schematic(s)

|  |
| --- |
|  |
| Figure : Simple RL circuit for inductance measurement . |

Results/Calculations:

Step 1-2

Table : LCR Meter Measurements

|  |  |
| --- | --- |
| Ltest | .962mH |
| RESR | 1.87 Ohm |
| RSense | 99.5 Ohm |

Step 5-8

|  |
| --- |
|  |
| Figure : Oscilloscope measurement of Vsense from Vs and Vc . |

Measured = 6 microseconds

Step 9

|  |
| --- |
| 6E-6 = L / 150  L = 9E-4 H  Measured L: 9.62E-4 H |
| Estimated = 9E-4 H |

Step 10 Error compared to Ltest

Error in measured inductance = (.962-.9)/.962 \* 100% = 6.44% (.962-.962)/.962 \* 100% = 0%

Error in estimated inductance = (.962-.9)/.962 \* 100% = 6.44%

Conclusion

|  |
| --- |
| Finding the time constant and measured resistance is a good way to estimate inductance. |

## Task 9.6.2

Objective

|  |
| --- |
| Light Doorbell design |

Circuit Schematic

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| --- |
|  |
| Figure : Latch Circuit using a 555 timer in monostable mode . |

Results/Calculations

Step 1

|  |
| --- |
| 5/ln(3)C=R |
| 45.5kOhm but 47kOhm was closest available  100 microF |

Step 3

|  |
| --- |
|  |
| Figure : Oscilloscope measuring Output and Threshold from the 555 timer . |
| 5.56 seconds |

Step 4

Table : Percent Error in Timer

|  |  |  |  |
| --- | --- | --- | --- |
|  | Designed | Measured | %Error |
| On time ( Seconds ) | 5 | 5.56 | 11.2% |

Conclusion

|  |
| --- |
| Calculating the R and C values from the time you want provides decent accuracy when practically building a timer. |

## Task 9.6.3

Objective

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| --- |
| LED strobe light design |

Circuit Schematic(s)

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| --- |
|  |
| Figure : Flasher using astable mode 555 timer circuit . |

Results/Calculations

Step 2

|  |
| --- |
|  |
| Figure : Oscilloscope of Threshold and Output of Circuit . |

Step 2-3

Table I : Calculated Error

|  |  |  |  |
| --- | --- | --- | --- |
|  | Designed | Measured | %Error |
| Frequency ( Hz ) | 1 | .962 | 3.85% |
| Duty Cycle ( % ) | 60 | 56 | 6.73% |

Step 4

|  |
| --- |
| f = 1.44/ ((R1+R2)+C) = 10  1.44 / ((2.2k + 5.6k) + C) = 10  1.85E-5 F = C  C = 18.5 microF |
| Required Capacitance = 18.5 microF |

Conclusion

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| --- |
| Calculating an R and C to achieve a certain frequency in the 555 timer is an accurate way to achieve that frequency. |