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Feedback to the student

 See also comments in the text

Very good

**Good**

Needs improvmt

C O N T E N T	<b>Completeness, quantity of content:</b> Has the report covered all aspects of the lab? Has the analysis been carried out thoroughly?			
	<b>Correctness, quality of content</b> Is the data correct? Is the analysis of the data correct? Are the conclusions correct?			
	<b>Depth of understanding, quality of discussion</b> Does the report show a good technical understanding? Have all the relevant conclusions been drawn?			
	Comments:			
P R E S E N T A T I O N	<b>Attention to detail, typesetting and typographical errors</b> Is the report free of typographical errors? Are the figures/tables/references presented professionally?			
	Comments:			

Raw report mark	/ 5
Penalty for lateness	

*The weighting of comments is not intended to be equal, and the relative importance of criteria may vary between modules. A good report should attract 4 marks.*

*1 mark / week or part week.  
Please use allowance forms to inform the teaching office about mitigating circumstances.*

Marker:

Date:

# 1 Introduction

This lab activity investigates laser characteristics, including light-current characteristics and output spectrum. The goal is to understand the behavior of lasers under different conditions and analyze their performance based on the measured data.

## 2 Part I: Measurement of Light-Current Characteristics

The apparatus used for this measurement includes a laser diode, a driver circuit, a photodiode for measuring output power, and a transimpedance amplifier to quantify output power by voltage output. The raw data collected from the experiment will be analyzed to determine some key parameters of the laser, and the circuits used in the experiment. The raw data will be available in appendix.

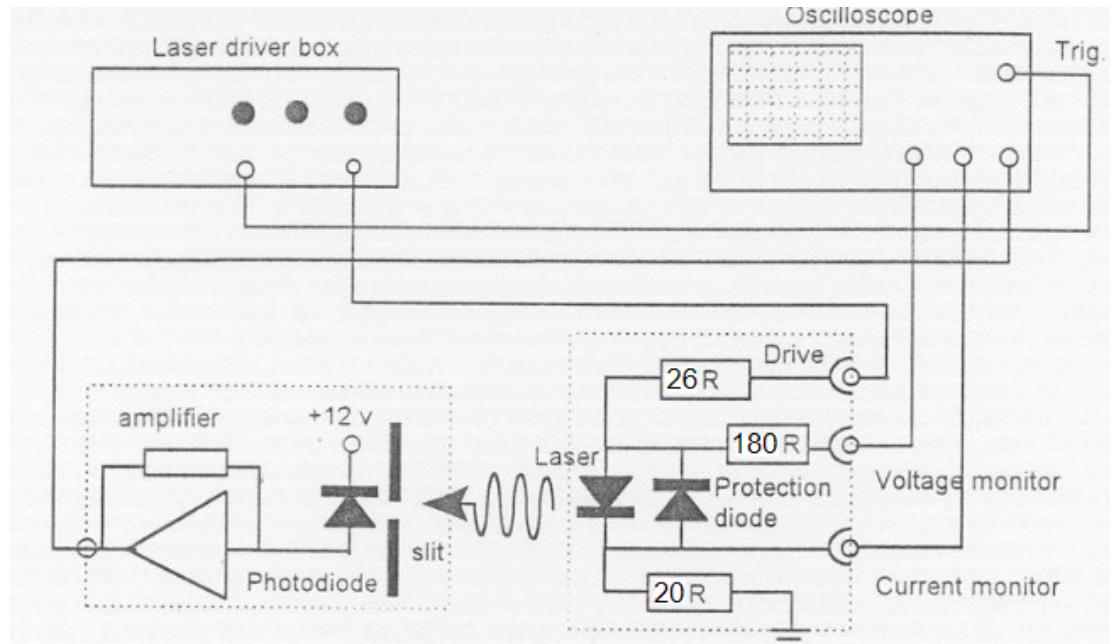


Figure 1: Circuit Diagram

### 2.1 L-I Curve Analysis

According to laser theory, photon emission becomes stimulated when the gain exceeds the losses in the laser cavity. This could be observed in the light-current (L-I) characteristics of a laser, where the output power increases significantly once the threshold current is reached. The expectation of the L-I curve is that it will show a linear increase in output power after the threshold current, with a steep slope indicating efficient lasing action.

As given in the lab handout, this threshold current is between 40 and 55 mA.

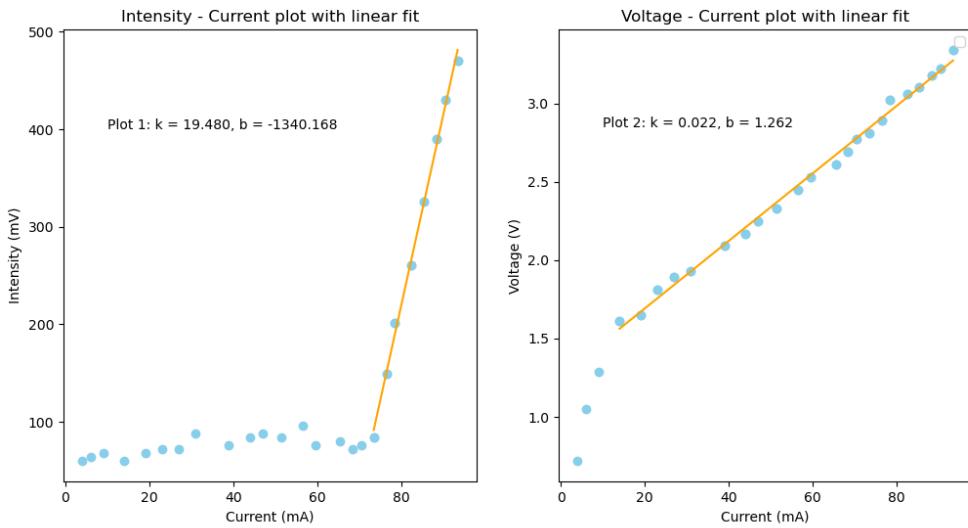


Figure 2: Plot and linear fit of raw data

### 3 Part II: Measurement of laser output spectrum

### 4 Conclusion

### 5 Appendix

Voltage Probe Reading (V)	Current Probe Reading (V)	Actual Current (mA)	Photodiode Probe Reading (mV)	I <sub>max</sub> (mA)	I <sub>max</sub> (V)
3.34	1.87	93.5	470	93.5	1.87
3.22	1.81	90.5	430		
3.18	1.77	88.5	390		
3.1	1.71	85.5	326		
3.06	1.65	82.5	261		
3.02	1.57	78.5	201		
2.89	1.53	76.5	149		
2.81	1.47	73.5	84		
2.77	1.41	70.5	76		
2.69	1.37	68.5	72		
2.61	1.31	65.5	80		
2.53	1.19	59.5	76		
2.45	1.13	56.5	96		
2.33	1.03	51.5	84		
2.25	0.94	47	88		
2.17	0.88	44	84		
2.09	0.78	39	76		
1.93	0.62	31	88		
1.89	0.54	27	72		
1.81	0.46	23	72		
1.65	0.38	19	68		
1.61	0.28	14	60		
1.29	0.18	9	68		
1.05	0.12	6	64		
0.72	0.08	4	60		

Intensity-Current plot

Voltage-Current plot

Figure 3: Raw Data