Title: **LAMP STUDY**
Ref Number: **7**
Location: **LIGHTING LABORATORY**
Supervisor: **JAFAR KHALID**
Academic: **JOSEPH PEKRIS**
Team Size: **~4**
Environment: **INDOORS**

OBJECTIVE

Investigation of the characteristics of a range of present day commonly used light sources.

APPARATUS

The selection of a type of light source for a specific application may depend on:

1. The Colour Appearance
2. The Colour Rendering Properties
3. Run-up Time
4. RE-strike Time
5. Efficacy (Lumens per Watt)
6. Wattage Range
7. Capital Cost a) of the lamp, and
   b) of any necessary control gear

The experimental equipment is designed to investigate items 1 to 4, and each booth contains a light source, an array of coloured ribbons, and an illuminance meter.

The light sources investigated are:

a)	35 Watt	SOX	Low Pressure Sodium
b)	70 Watt	SON	High Pressure Sodium
c)	70 Watt	HPI	High Pressure Mercury with Halogen Additives
d)	100 Watt	SDW	White High Pressure Sodium
e)	125 Watt	HPL	High Pressure Mercury
f)	300 Watt	GLS	Tungsten
g)	300 Watt	TH	Tungsten Halogen

As well as a range of Phillips 80 Watt low pressure mercury fluorescent lamps.

PROCEDURE

1. RUN-UP TIME

Switch on the illuminance meters. Note the time, and switch on each lamp. Observe the change in illuminance and colour appearance of each lamp as it runs up. The illuminance may be considered fully run-up when the illuminance at the centre of each booth remains constant. Note the time at which the light output of each lamp has stabilised and calculate **THE RUN-UP TIME**.

PLEASE NOTE: Once you have switched on the Discharge lamps, try not to switch them off again until STEP 4. A break in supply might adversely affect your overall findings or results.

ANOTHER NOTE: The Illuminance meters used in this experiment burn out batteries at an alarming rate. Therefore, switch off the meters whenever they are not being actually used.

2. COLOUR APPEARANCE

Look at each lamp in turn. Observe the colour appearance of the white surface inside each booth and record the colour appearance of the source. The colour appearance may be considered in terms of warm, cool, intermediate, or in terms of colour, i.e. blue white, cream-white etc.

3. COLOUR RENDERING

Observe the coloured ribbons at the rear of each booth and comment on the degree of correctness or distortion of each colour for each light source.

4. RE-STRIKE TIME

Switch off each lamp in turn and then switch each lamp back on immediately (simulating an interruption in the power supply) Observe

a) the time taken for each lamp to re-strike, and
b) the time taken to return to fully light output.

5. CONTROL GEAR

Examine the circuitry of each lamp and note:

a) the amount of control gear necessary, and
b) the weight of the equipment

6. CAPITAL COST

Using the manufacturer's data of Table No. 2, determine the cost per 1000 lumens per year, for each lamp:

a) in terms of Capital Costs, and
b) in terms of running costs.

Assume that the map is used for 9 hours per day, six days a week and 52 weeks a year. That is 2808 hours per year.

TASK VISIBILITY

Using the colour coded resistors provided and Table No. 1, determine the value of resistance for different values of resistor using each light sources. Comment on the ease of detection of colours.

PLEASE NOTE: During the examination of the resistors, use the black card or sheet provided to stop stray light from other sources affecting the results, i.e. daylight or room light.

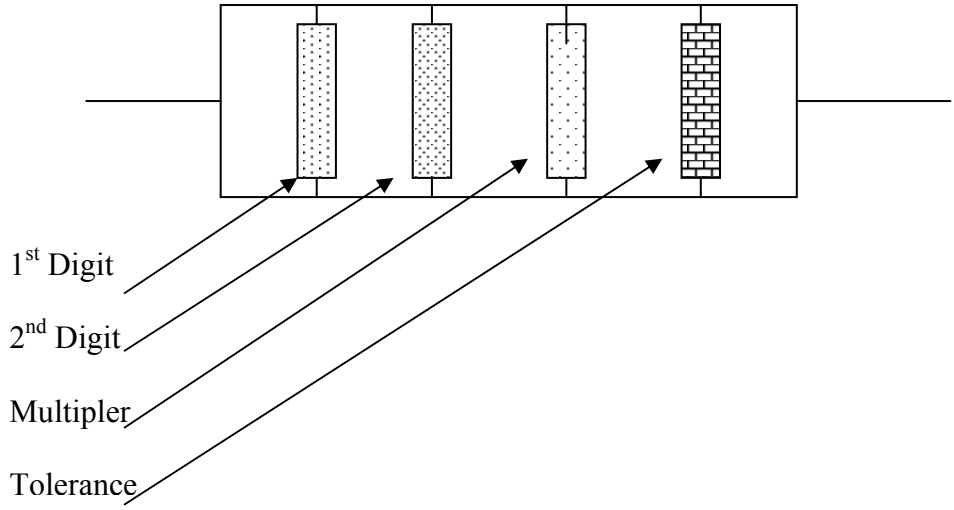

Table 1

Black =0	Brown=1	**Red**=2
Orange=3	Yellow=4	Green=5
Blue =6	Violet=7	Grey=8
White =9	Read colour bands from left to right on resistor	
The mulitpler is the number of noughts to be added to the number represented by the first two colours e.g. Blue, Grey, Orange would be 6 8 000 = 680000 or 68k Ohms		

Table 2

Lamp Costs (1992 pricing)					
Lumens	Lamp Type	Lamp Cost	Ballast	Ignitor	Capacitor
4500	35w LPS	£24.42	£16.83	£25.27	£7.05
5850	70w HPS	£42.17	£22.09	£31.92	£8.05
5000	70w MBI	£53.63	£17.92	£31.92	£8.70
4800	100w SDI	£64.14	£26.45	£71.90	£9.72
5800	125w MBF	£14.41	£20.41	---	£8.70
4650	300w GLS	£6.52	---	---	---
5100	300w TH	£7.73	---	---	---

RESULTS

Write up observations and calculations in your logbook**.**

	Run-Up Time	Colour Appearance	Colour Rendering	Re-Strike Time		Control Gear	Capital Cost	Task Visibility
35w Low-Pressure Sodium								
70w Metal Halide								
70w High-Pressure Sodium								
100w White Sodium								
125w High Pressure Mercury								
300w GLS Tungsten								
300 w Tungsten-Halogen								