

# Visual Hygiene

*An Essay*

Submitted for partial fulfillment of M.Sc. Degree in Ophthalmology

*Presented by*

**Tarek Ahmed Abdul-Salam Youssef**  
*M.B.,B.Ch.*

*Supervised By*

**Prof. Dr. Shaker Ahmed Khedr.**

*Prof. of Ophthalmology  
Faculty of Medicine  
Ain Shams University*

6/7.71  
T. A



**Prof. Dr. Mohammed Adel Abd El-Shafik**

*Prof. of Ophthalmology  
Faculty of Medicine  
Ain Shams University*

6470

**Dr. Mamdouh H. El-Kafrawy**

*Lecturer of Ophthalmology  
Faculty of Medicine  
Ain Shams University*



**Faculty of Medicine  
Ain Shams University  
1998**





بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



المقدمة :

١. د. طه محمد محمد السبوي مضمون فاضل اسناد الرمز - طب القاهرة  
١. د. محمد عمر محمد راشد مضمون دافق طبية شمس  
١. د. ناكرا محمد سليمان حفتر مضمون الحشرية طبية شمس
- ش/١٤٤٢



# Table of Content

<i>Table of Content</i> .....	1
<i>List of Figures</i> .....	2
<i>List of Tables</i> .....	3
<i>List of Abbreviations</i> .....	4
<i>Acknowledgment</i> .....	6
<i>Introduction and Aim of the Work</i> .....	7
<i>Chapter One: Electromagnetic Radiation</i> .....	9
<i>Chapter Two: Illumination &amp; The Eye</i> .....	47
<i>Chapter Three: Visual Display Units</i> .....	66
<i>Chapter Four: Prevention of Eye Infections</i> .....	83
<i>Chapter Five: Sports Eye Injuries</i> .....	100
<i>Chapter Six: Pediatric Visual Hygiene</i> .....	106
<i>Chapter Seven: Driving</i> .....	111
<i>Chapter Eight: Blindness</i> .....	124
<i>English Summary</i> .....	134
<i>References</i> .....	136
<i>Arabic Summary</i> .....	152





# List of Figures

<i>Figure 1</i> UVR effect on DNA and it Repair .....	13
<i>Figure 2</i> Electromagnetic Spectrum .....	14
<i>Figure 3</i> Sites of absorption of different optical radiation .....	16
<i>Figure 4</i> The anterior segment act as a lens that focus light transcameral to the nasal limbus .....	24
<i>Figure 5</i> The anterior segment act as a lens that focus light transcameral to the nasal equator of the cystalline lens .....	25
<i>Figure 6</i> A summary of the possible anterior segment complications of UV radiation .....	27
<i>Figure 7</i> A schematic diagram of the Scanning Laser Ophthalmoscope .....	42
<i>Figure 8</i> Recommended illumination ratios and surface reflectances .....	52
<i>Figure 9</i> Reflections by low minus lenses .....	62
<i>Figure 10</i> Bright sources can be imaged by the cornea and then by a spectacle lens to form an amoying bright spot in the visual field .....	62
<i>Figure 11</i> Optical principle of an antireflective coating .....	64
<i>Figure 12</i> The focusing ability varying with age. ....	72
<i>Figure 13</i> The restricted range of clear vision of older operators wearing spectacles only for reading. ....	72
<i>Figure 14</i> Executive bifocal lenses .....	73
<i>Figure 15</i> Trifocal lens .....	74
<i>Figure 16</i> The typical dimensions and surface reflectance of a workstation according to BS 7179 (1990). ....	79



# List of Tables

<i>Table 1 The ranges and sources of different wavelengths of light.</i>	<i>17</i>
<i>Table 2 Safe viewing time for various ophthalmic instruments</i>	<i>39</i>
<i>Table 3 Photometric Units.</i>	<i>49</i>
<i>Table 4 WHO Visual Impairment-Level Classification</i>	<i>125</i>
<i>Table 5 Epidemiology and Causes of Worldwide Blindness</i>	<i>126</i>



# *List of Abbreviations*

AMD	Age-related macular degenerations
ANSI	the appropriate American National Standard
AOP	Association of Optometrists
CIBS	Chartered Institute of Building Services
CR39	Columbia Resin 39 made of allyl diglycol carbonate
EKC	Epidemic keratoconjunctivitis
eV	Electron Volt, which measures electron energy
GHz	A billion ( $1 \times 10^9$ ) cycles per second
HSE	Health and Safety Executive
IR A,B,C	Infra-red radiation , A (780-1400 nm) B ( 1400-3000nm) C (3000-10000)
J/cm <sup>2</sup>	Joule per square meter
LASIK	laser in situ keratomileusis
LGV	Large goods vehicles
lm/m <sup>2</sup>	lumen per square meter
lx	Lux = lumen/m <sup>2</sup> a unit of Illuminance
MHz	A million ( $1 \times 10^6$ )cycles per second
MPE	Maximum permissible exposure
mW	Milliwatt
NIOSH	US national Institute of Occupational safety and Heath
PCV	Passenger-carrying vehicles

PUVA	Psoralen Ultra-violet A treatment (A treatment for psoriasis)
Rad	Rad is defined as the absorbed dose of radiation when 1gm of material absorbs 100 ergs of energy; 1 rad = $10^{-2}$ J/kg
TRRL	Transport and Road Research Laboratory
UV A, B, C	Ultra-violet radiation A (315-400nm) B (280-315nm) C (200-280nm)
WHO	World Health Organization