

AL-FARABI KAZAKH NATIONAL UNIVERSITY

A.D. Muradov
G.Sh. Yar-Mukhamedova
G.K. Mussabek

OPTICS

Educational manual

Almaty
«Qazaq University»
2019

UDC 535 (075)
LBC 22.3 я 73
М 96

*Recommended for publication by the decision
of the Academic Council
of the Faculty of Physics and Technology,
Editorial and Publishing Council of Al-Farabi Kazakh National University
(Protocol №4 dated 16.04.2019);
Educational and Methodological Association (PMG)
for training specialists in the fields "Telecommunications"
and "Engineering" on the basis of AUEC and EMA of REMC
for students of the specialty "RET"
(Protocol №1 dated October 23, 2019)*

Reviewers:

Doctor of Technical Sciences, Professor *D.U. Smagulov*
Doctor of Physical Sciences, Professor *M.E. Abishev*

Muradov A.D.

М 96 Optics: educational manual / A.D. Muradov, G.Sh. Yar-
Mukhamedova, G.K. Mussabek. – Almaty: Qazaq University,
2019. – 154 p.

ISBN 978-601-04-3998-6

The present educational manual is a guide for laboratory work implementation on "Optics" section of the general physics course. Here, for each laboratory work a theoretical introduction with description of the main studying physical phenomena and laws, description of the equipment specification for work implementation, work task and questions for self-control are given. The manual includes works related with use for observation and measurement of both simple optical devices with mechanical management and complex digital systems.

The content of "Optics" editorial manual corresponds to the syllabus and the educational-methodical complex of the discipline "Optics", which is a mandatory component of training bachelors, according to the State Compulsory Education Standard of the Republic of Kazakhstan in a wide range of engineering specialties.

UDC 535 (075)
LBC 22.3 я 73

ISBN 978-601-04-3998-6

© Muradov A.D., Yar-Mukhamedova G.Sh.,
Mussabek G.K., 2019
© Al-Farabi KazNU, 2019

CONTENT

Preface	3
1. Measurement of liquids refractive indices by refractometer	5
2. Determination of glass plate refractive index through microscope	22
3. Determination of light wave length by means of Fresnel biprisms	29
4. Determination of light wavelength through Newton's rings	43
5. Verification of the Malus law	52
5.1. Investigation of Malus law and passage of polarized light through phase plate	62
6. Study of emission and absorption spectra through monochromator.....	71
7. Study of basic laws of the external photoelectric effect	77
8. Investigation of Bouguer law and measurement of optical medium absorption coefficient	82
9. Installation for observation of Fresnel zones / zone plate	89
10. Investigation of light diffraction phenomena	95
11. Investigation of absorption and transmission spectra.....	106
12. Investigation of optical glass dispersion	114
13. Digital microscopy.....	120
14. Measurement of wedge angle on the interference pattern of equal thickness fringes	135
15. Determination of the distance between slits in Jung'sw experiment....	142
Appendix	147
Basic physical constants	147
Conversion factors for energy units	148
Transmission spectrum of red light filter	149
Transmission spectrum of yellow light filter	150
Transmission spectrum of green light filter	151
Transmission spectra of colour glass (measurement results)	152

Educational issue

Muradov Abyl Darkhanovich
Yar-Mukhamedova Gulmira Sharifovna
Mussabek Gauhar Kalizhankyzy

OPTICS

Educational manual

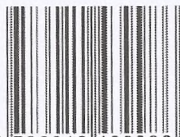
Editor *Y. Popova*
Typesetting *G. Kaliyeva*
Cover design *Y. Gorbunov*

IB №12815

Signed for publishing 30.10.2019. Format 60x84 ¹/₁₆. Offset paper.
Digital printing. Volume 9,62 printer's sheet. 500 copies. Order №3122.

Publishing house «Qazaq University»
Al-Farabi Kazakh National University
KazNU, 71 Al-Farabi, 050040, Almaty

Printed in the printing office of the «Qazaq University» publishing house.



9 786010 439986