



மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
MANONMANIAM SUNDARANAR UNIVERSITY

**SYLLABUS FOR DIPLOMA IN OPTOMETRY PROGRAMME OFFERED
THROUGH DIRECTORATE OF VOCATIONAL EDUCATION
(COMMUNITY COLLEGES AND VOCATIONAL SKILL DEVELOPMENT CENTRES)
FROM 2024 - 2025**



DIPLOMA IN OPTOMETRY -5278

பார்வை அளவையியல் பட்டயம்

SCHEME OF EXAMINATION

| Course code | Title of the Course | Credit | Hours | Passing Minimu |
|--------------------|---------------------------------------|--------|-------|----------------|
| Semester I | | | | |
| C24OP11 / E24OP01 | Ocular Anatomy | 6 | 90 | 40/100 |
| C24OP12 / E24OP02 | Ocular Physiology | 6 | 90 | 40/100 |
| C24OP13 / E24OP03 | Geometrical Optics | 6 | 90 | 40/100 |
| C19CE10 / E19CE10 | Communicative English | 6 | 90 | 40/100 |
| C24OPP1 /E24OPP1 | Practical I - Geometrical optics | 4 | 120 | 40/100 |
| Semester II | | | | |
| C24OP21 / E24OP04 | Microbiology & Pathology | 6 | 90 | 40/100 |
| C24OP22 / E24OP05 | Physical Optics | 6 | 90 | 40/100 |
| C24OP23 / E24OP06 | Optometric Instruments | 6 | 90 | 40/100 |
| C19LS23 / E19LS05 | Life Skill | 10 | 90 | 40/100 |
| C24OPP2 / E24OPP2 | Practical II - Optometric Instruments | 4 | 120 | 40/100 |

Eligibility for admission: Pass in 10th std examination conducted by the Govt. of Tamil Nadu Board of Secondary Education, Government of Tamil Nadu or any other equivalent examination.

Examination: Passing Minimum for each Course is 40%. Classification will be done on the basis of percentage marks of the total marks obtained in all the Courses and as given below:

- 40 % but less than 50 % - Third class
- 50 % but less than 60 % - Second class
- 60 % and above - First class

Theory Paper

Internal Marks-25

External Marks-75

SYLLABUS

Semester - I

| | | |
|------------|---|----------------------------------|
| Course I | : | Ocular Anatomy |
| Course II | : | Ocular Physiology |
| Course III | : | Geometrical Optics |
| Course IV | : | Communicative English |
| Course V | : | Practical I - Geometrical Optics |

Semester - II

| | | |
|-------------|---|---------------------------------------|
| Course VI | : | Microbiology & Pathology |
| Course VII | : | Physical Optics |
| Course VIII | : | Optometric Instruments |
| Course IX | : | Life Skill |
| Course X | : | Practical II - Optometric Instruments |

***(Semester Pattern for Community College Only)**

SEMESTER I
COURSE I
(C24OP11 / E24OP01)OCULAR ANATOMY

Unit I

18 Hrs

Structure & Developments of the eye:

Introduction - Embryology – Formation of Eye - Development of various structure of eye ball - Milestones of development of ocular structures. - Orbit and Orbital Nerves -. Orbital nerve – Oculomotor nerves.

Unit II

18 Hrs

Gross Anatomy of Eyelid:

Glands of the Lids - Blood Supply - Nerve Supply. Conjunctiva: Gross anatomy - Microscopic structures - Glands - Accessory structures - Blood Supply - Nerve Supply. Lacrimal apparatus: Lacrimal glands - Lacrimal passages. Retina - Rods and Cones – Blood supply.

Unit III

18 Hrs

Microscopic structure of Eye:

Cornea: Blood supply - Nerve supply. Sclera: Thickness – Special regions – Scleral apertures -Blood supply - Nerve supply. Anterior chamber: Angle of the anterior chamber.

Unit IV

18 Hrs

Appearance of Uvea & Lens:

Uvea: Iris - macroscopic & microscopic appearance - Ciliary body - microscopic structure & ciliary processes. Choroid - macroscopic structure - Blood supply. Lens: Introduction – Structure of the lens - Structure of ciliary zonules.

Unit V

18Hrs

Visual Pathway:

Optic nerve - Optic chiasma - Optic tracts - Lateral geniculate body - Optic radiations – Visual cortex - Arrangement of nerve fibres - Blood supply. The Ocular motor system: Extraocular muscles – Origin, Course, Insertion, Blood supply and Nerve supply.

Text Books:

1. AK Khurana, Indu Khurana: *Anatomy and Physiology of Eye*, Second edition, CBS Publishers, New Delhi, 2006.
2. 4. *Clinical Anatomy of the Eye* 2nd Edition, Kindle Edition by Richard S. Snell (Author), Michael A. Lemp

Reference books:

- ❖ Remington: *Clinical Anatomy of the Visual System*, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.
- ❖ *Functional Anatomy and Histology of Eye* – Gordon Ruskell, Butterworth Heinemann
- ❖ *Atlas of Ocular Anatomy Hardcover* –2016 by Mohammad Wakeel Ansari, Ahmed Nadeem

SEMESTER I

COURSE II

(C24OP12 / E24OP02) OCULAR PHYSIOLOGY

Unit I

18 Hrs

Functions of Cornea & Aqueous Humour:

Cornea: Functions - Corneal transparency - Factors affecting corneal transparency. Uveal tissue: Functions. Aqueous Humour: Functions and Properties - Formation of Aqueous humour - Drainage & circulation of Aqueous Humour - Rates of production & flow. Intraocular pressure: Features of normal IOP - Factors influencing the IOP - Measurement of IOP.

Unit II

18 Hrs

Functions of Lens & Retina:

Lens: Function of lens - Lens transparency - Changes in ageing lens - Cataract. Accommodation: Far point, near point - Mechanism of accommodation – Relaxation theory, Increased tension theory, - Changes in accommodation. Vitreous Humour: Functions –Physicochemical properties. Retina: Organization of retina - Functions of retina – Initiation and transmission of visual sensations, Visual perception. Optic Nerve: Lesions of the visual pathway - Physiology of optic nerve

Unit III

18 Hrs

Physiology of eyelid movements:

Opening & Closing movements - Muscles of lid closer & opening - Peering – Blinking. Lacrimation: Lacrimal glands – Functions of Tear film - Tear film dynamics. Pupil: Normal pupil - Physiological changes in pupil size - Isocoria - Pupillary unrest - Hippies - Pupillary reflex – Light reflex, Near reflex, Darkness reflex, Psycho sensory reflex, Lid closure reflex – Abnormalities of pupil and pupillary reflexes.

Unit IV

18 Hrs

The ocular motor system:

Extra ocular muscles - Functions - Basic Kinematics - Mechanics of actions – Agonist, Antagonist, Synergist and Yoke muscles - Fundamental laws (Donder's, Listing's, Herring's and Sherrington's law) - Ocular Movements (Monocular and Binocular) - Supranuclear eye movement systems.

Unit V

18 Hrs

Ocular Circulation:

Vascular structure of the eye – ocular circulation, blood - ocular barrier. Regulation of ocular circulation. Visual Adaptation: Dark adaptation curve - Mechanism of dark adaptation - Factors influencing dark adaptation - Time course of light adaptation - Mechanism of light adaptation - Rod vs. cone light adaptation.

Text Books:

1. Comprehensive Ophthalmology by A K Khurana – 9th Edition.
2. Essentials of Ophthalmology by Samar k Basak – 8th Edition.

Reference Books:

- ❖ A Remington: *Clinical Anatomy of the Visual System*, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.
- ❖ *Clinical Ocular Physiology* – Nagi Hang Victor Chong, Butterworth Heinemann

SEMESTER I
COURSE III
(C24OP13 / E24OP03) GEOMETRIC OPTICS

Unit I

18 Hrs

Nature of Light:

Light as an electromagnetic wave – ideas of sinusoidal oscillation – Fermat's principle – geometrical and optical path lengths – laws of reflection and refraction using Fermat's principle – reflection by plane and spherical mirrors – reflectivity and transmittance – concepts of wave fronts and rays – Vergence – divergence and convergence.

Unit II

18 Hrs

Refractive Index:

Absolute and relative refractive indices – Snell's law – Refraction by plane glass slab – Refraction by spherical surfaces – convex and concave – Derivation of Vergence equation – Focal points – lateral and axial magnification – Thin lenses - imaging by thin convex and concave lenses – image properties

Unit – III

18 Hrs

Front and Back vertex powers:

Equivalent power – equivalent focal length of two thin lenses placed in contact and separated by a distance – Thick lenses – Cardinal points/planes – matrix methods in paraxial optics – refraction and translation matrices.

Unit – IV

18 Hrs

Aberrations:

Chromatic aberrations – methods of removing chromatic aberration – monochromatic aberrations - spherical aberrations, coma, astigmatism, distortion and curvature of field – ways of minimizing them.

Unit – V

18 Hrs

Solid Prisms:

Deviation produced by a prism – angular dispersion – dispersive power – reflecting prisms – total internal reflection and critical angle – optical fibres – types and theory of OFCS – uses.

Text Books:

1. A Text book of Optics, S Chand Co by Dr.N. Subrahmanyam, Brijlal, & M.N. Avadhanulu.
2. Optics – Principles and Applications by K K Sharma.

Reference Books:

- ❖ Pedrotti L.S, Pedrotti Sr.F.L, *Optics and Vision*, Prentice hall
- ❖ Keating.N.M, *Geometric, Physical and Visual Optics*
- ❖ Milton Kartz, *Introduction to Geometric Optics*, World Scientific Publishing Co.

SEMESTER I

COURSE IV

(E19CE10/C19CE10)COMMUNICATIVE ENGLISH

1. **Basic Grammar:**

- a. Review of grammar
- b. Remedial study of grammar
- c. Simple sentence
- d. Word passive voice etc.

2. **Bubbling Vocabulary:**

- a. Synonyms
- b. Antonyms
- c. One – work Institution

3. **Reading and Understanding English**

- a. Comprehension passage
- b. Précis – writing
- c. Developing a story from hints.

4. **Writing English**

- a. Writing Business letters.
- b. Paragraph writing
- c. Essay writing
- d. Dialogue writing

5. **Speaking English**

- a. Expressions used under different circumstances
- b. Phonetics
- c.

Reference

- ❖ V.H.Baskaran – “English Made Easy”
- ❖ V.H.Baskaran – “English Composition Made Easy” (Shakespeare Institute of English Studies, Chennai)
- ❖ N.Krishnaswamy – “Teaching English Grammar”(T.R.Publication, Chennai)
- ❖ “Life Skill” – P.Ravi, S.Prabakar and T.Tamzil Chelvam,M.S.University, Tirunelveli.

SEMESTER I

COURSE V

(C24OPP1 / E24OPP1) PRACTICAL I – GEOMETRIC OPTICS

Experiments

1. Image formation by spherical mirrors.
2. u.v method – focal length of the lens.
3. Spherical lenses – power determination liquid lens.
4. Refraction through a glass slab.
5. Spherometer – radius of curvature.
6. Refractive index of a transparent liquid by travelling microscope.
7. Spectrometer – Refractive index of a solid prism.
8. Spectrometer – solid prism (i – d curve).
9. Spectrometer – dispersive power of a prism.
10. Spectrometer – grating constant.
11. Nodal slide – cardinal points.

Reference Books:

- ❖ .A practical guide to experimental geometrical optics – Yuriy A Garboviskiy, Anatoliy V. Glushchenko.
- ❖ Manual of Optics and Refraction by PK Mukherjee – 2nd Edition.
- ❖ Simple experiments in optics – Roshan Aggarwal and Kambiz Alavi
- ❖ Optics experiments and demonstration for student laboratories – Stephan G Lipson

SEMESTER II
COURSE VI
(C24OP21 / E24OP04) MICROBIOLOGY & PATHOLOGY

Unit I **18 Hrs**

Introduction to microbiology:

Definition of microbiology and Ocular microbiology, Normal ocular flora. Morphology of bacteria and virus. Sterilization and disinfection – Physical and chemical methods. General immune system, structure and function of immunoglobulin. Basic laboratory Techniques- Collection of specimens; Conjunctiva swab, Lacrimal sac.

Unit II **18 Hrs**

Ocular Bacteriology:

Clinical importance, ocular lesions of: Gram positive cocci -Staphylococci, Streptococci, Pneumococci; Gram negative cocci –Gonococci and Meningococci; Gram positive bacilli – Corynebacterium diphtheriae; Gram Negative bacilli –Pseudomonas, Haemophilus; Mycobacteria – M. Tuberculosis; Spirochetes – Treponema pallidum,

Unit III **18 Hrs**

Ocular Virology:

Clinical importance, ocular lesions and treatment of Common virus – Poxvirus, Adenovirus, Picornavirus, Rubella and Retro virus. Ocular Parasitology: Clinical importance, Ocular lesions and treatment of Acanthameoba, Toxocara, Filaria, Toxoplasma.

Unit IV **18 Hrs**

General Pathology:

Tissue injury, vascular and cellular components involved in inflammation. Healing and Repair – Role of Vascular and Cellular component

Unit V **18 Hrs**

Ocular pathology:

Eye lids – Chalazion, Hordeolum internum and externum; Conjunctiva - conjunctivitis; Cornea - Ulcers; Lens - Pathology of cataract, types, Lens induced glaucoma & uveitis and Diabetic cataract. Tumours – Retinoblastoma, Malignant Melanoma, Squamous cell carcinoma, Lacrimal gland tumors.

Text Books:

1. Textbook of Microbiology by Ananthanarayan and Paniker – 7th Edition.
2. Textbook of Pathology by Harsh Mohan – 8th Edition.

Reference Books:

- ❖ Microbiology: An Introduction by Tortora GJ, Funke BR, and Case CL
- ❖ Clinical Ocular Pathology – John Harry- Gery Misson, Butterworth Heinemann

SEMESTER II
COURSE VII
(C24OP22 / E24OP05) PHYSICAL OPTICS

Unit I **18 Hrs**

Huygens' Principle:

Laws of reflection and refraction at a plane surface. Wave equation, Wave velocity & group velocity; determination of velocity of light (any one method). Simple harmonic waves - mathematical representation.

Unit II **18 Hrs**

Interference:

Path and phase difference. Theory of interference fringes - intensity distribution in fringes. Young's double slit experiment- fringe width. Fresnel's biprism, Lloyd mirror - visibility of fringes in them. Interference in thin films - Newton's ring experiment -Thin film anti-reflection coatings.

Unit -III **18 Hrs**

Diffraction:

Fresnel and Fraunhofer diffraction. Diffraction by single slit, double slit, multiple slit. Diffraction grating- transmission and reflection. Diffraction by circular aperture - airy pattern. Dispersion by grating - dispersive power, resolution.

Unit IV

Polarization:

18 Hrs

Linearly polarized light - Production of linearly polarized light. Anisotropic crystals – calcite crystal. Linear polarizers – Nicol prism, Polaroid sheets. Malus' law – nicol prism as polarizer and analyser. Circularly and elliptically polarized light - analysis of light of unknown polarization – Optical activity – Scattering of light – Raman effect.

Unit V **18 Hrs**

Laser fundamentals - spontaneous and stimulated emissions – Einstein's theory – Population inversion, lasing action – ruby laser. Laser in ophthalmic surgery. Holography – basic principle, some applications. Spectrum - emission and absorption spectra - classification (visible, ultraviolet, infrared). Measurement of light – radiometry and photometry – photometric units .

Text Books:

1. A Text book of Optics, S Chand Co by Dr.N. Subrahmanyam, Brijlal,& M.N.Avadhanulu.
2. Optics – Principles and Applications by K K Sharma.

Reference Books:

- ❖ Pedrotti L S, Pedrotti Sr. F L - *Optics and vision* - Prentice hall, New Jersey, USA.
- ❖ Keating - *Geometrical, physical and visual optics* - Butter Worth – Heinemann, Massachusetts, USA.
- ❖ Tunnacliffe A H, Hirst J G – *Optics* - the association of British opticians - London, USA.

SEMESTER II

COURSE VIII

(C24OP23 / E24OP06) OPTOMETRIC INSTRUMENTS

Unit I

Trial Set:

18 Hrs

Trial Frame & its components, Trial lens & Accessories - Pinhole, Occluder, Stenopaic slit, Maddox rod, Red-Green filters. Vision Charts: Distance & Near, Snellen & Log MAR, Pediatric vision charts, Vision drum, Projection charts. Lensometer: Manual & Automated lensometer.

Unit II

18 Hrs

Retinoscope:

Spot retinoscope, Streak retinoscope -Autorefractometer.

RAF ruler - Prism bar - Cover Test - Maddox rod - Maddox wing - Synoptophore.

Unit III

18 Hrs

Tonometer: Principles, types, clinical significance.

Keratometer - Corneal topography - Slit lamp.

Unit IV

18 Hrs

Dry eye evaluation:

Schimmer's, TBUT, NITBUT, Lacrimal syringing, ROPLAS. Colour Vision testing devices.

Visual Field: Amslers chart, Bjerrum screen, Automated Perimetry.

Unit V

18 Hrs

Ophthalmoscope - Gonioscope - A Scan - B Scan - Pachymeter.

Text Books:

1. Optometric Instrumentation and Techniques by Sandeep Nair.

2. Ocular Instruments: A Guide by Ramesh C. Gupta.

Reference Books:

- ❖ David B Henson: Optometric Instrumentation, Butterworth-Heinemann Ltd
(1 December 1982)
- ❖ Optometric Instrumentation - Santosh K. Kumar
- ❖ Primary Care Optometry - Theoder Grosvenor

SEMESTER II
COURSE IX
(C19LS23/E19LS05) LIFE SKILL

I Life Coping or adjustment

- (a) External and internal influence in one's life
- (b) Process of coping or adjustment
- (c) Coping with physical change and sexuality
- (d) Coping with stress, shyness, fear, anger far live and criticism.

II Attitude

- (a)Attitude
- (b)Self acceptance, self - esteem and self actualization
- (c)Positive thinking

III Problem Solving

- (a)Goal Setting
- (b)Decision Making
- (c) Time Management and stress Management.

IV Computers

- (a)Introduction to Computers
- (b)M.S.Office
- (c)Power Point

V Internet

- (a)Introduction to internet
- (b)E - mail
- (c)Browsing

References:

- 1) Life Skill Programme course I & II by Dr.Xavier Alphona MCRDCE Publications. R.K.Mutt Road, Chennai - 28
- 2) ஆளுமை பண்பு வளர்த்தல் மற்றும் தகவல் தொடர்பு by M.Selvaraj Community College,Palayamkottai
- 3)“Life Skill” -P.Ravi, S.Prabakar & T.Tamil Chelvam, M.S. University, Tirunelveli.

SEMESTER II
COURSE X
(C24OPP2 / E24OPP2) PRACTICAL II – OPTOMETRIC INSTRUMENTS

Experiments:

1. Refractive instruments: Test chart standards
2. Trial case lenses
3. Lensometer.
4. Auto refractors
5. Retinoscope.
6. Tonometer
7. Keratometer
8. Schirmer's test.
9. Colour vision testing devices
10. Orthoptic Instruments.
11. Fields of vision and screening devices.

Reference Books:

- ❖ Manual of Optometry Instruments and Procedures by Vivekanand – AITBS Publishers, India.
- ❖ 2. Manual for Ophthalmic Instruments & Clinical Procedures by Manjusha Lakshmi. M 2nd Edition.