

# **SYLLABUS**

**for Courses affiliated to the  
Kerala University of Health Sciences**

**Thirissur 680596**



**BACHELOR OF SCIENCE IN OPTOMETRY**

**Course Code: 013**

**(2024 Academic year onwards)**

## 2. Course Content

### 2.1 Title of course:

The name of the course shall be “Bachelor of Science in Optometry” – B.Sc. (OPT)

### 2.2 Objectives of course

The Course aims at carving out graduates in Optometry who will be well versed in

- Helping the Ophthalmologist in his practice
- Do refraction, contact lens fitting and orthoptic assessment independently
- Involve and do special investigative procedures
- To operate and maintain Ophthalmic instruments
- To maintain Ophthalmic theatre and Operating Instruments
- To run and establish an Optical shop

### 2.3 Medium of instruction:

Medium of instruction shall be English

### 2.4 Course outline

The course shall comprise of the theoretical and practical studies in different branches of Optometry and its related subjects.

Besides practical classes, the training in Optical work should be given in clinics, with the candidate taking active part in the routine work of the out-patient department.

The Course content is divided in to 3 categories; must know, desirable to know and nice to know, which is indicated as must know (\*\*\*) , desirable to know (\*\*) and nice to know (\*). A maximum of 60% of questions for the University examination should be from must know portions of the content, 30% may be from desirable to know portions of content and a maximum of 10% of questions from Nice to know content for university examination.

#### Subjects in 1<sup>st</sup> yr

#### Subjects 2<sup>nd</sup> yr Optometry

General Anatomy	General & Ocular Pharmacology
Ocular Anatomy	General & Ocular Pathology
General Physiology	Microbiology , Sterilization & Theatre techniques
Ocular Physiology	Clinical examination of the visual system & Eye Instrumentation
Physical Optics & Geometrical Optics 1 & 2	Visual optics
Bio Chemistry & Nutrition	Optometric optics 1&2
Foundation course in pre clinical optometry & Allied health profession	

Eye Disease 1 & 2
Contact Lens 1 & 2
Low Vision Aids , Mechanical and dispensing optics
Binocular Vision , Squint & Orthoptics
Community optometry ,occupational optometry , law and optometry ,public health optometry
Geriatric and Paediatric optometry
Systemic diseases
Epidemiology , Research Methodology & Biostatistics
Project Works in Optometry

### 2.5 Duration

The duration of the course shall be 4 years including one year compulsory rotating internship which follows semester system with examinations at the end of each year. Approximately 240 working days in a year with a minimum of 6 hours per day which works approximately 1450 working hours per year. After the 3rd year, they have to do a compulsory rotating internship in various specialty departments for one year.

### 2.6 Subjects

As given under “Teaching learning methods” and “Content of each subject in each year”

### 2.7 Total number of hours

Approximately 240 working days in a year with a minimum of 6 hours per day which works approximately 1450 working hours per year. Internship hours or schedule can be decided by the training institute

### 2.8 Branches if any :

General Ophthalmology & Community services

Basic Optometry

Optical services

Cataract & Anterior segment & LASIK

Cornea & Contact lens

Orthoptics & Squint & Paediatric Ophthalmology

Retina & Galucoma Investigations

(Other Speciality clinics like Myopia ,dry eye , neuro ophthalmology , teleophthalmology ,etc also may be provided )



## 2.9 Teaching learning methods & Contents in Each Year :

1<sup>st</sup> yr Bsc optometry.

**PRECLINICAL SUBJECTS (To Be Conducted From Various Department Of Ophthalmology ,Optometry ,Hospital Specialities, Nursing Department Or Guest Lecturers )**

**SUBJECT :**

**Foundation course to preclinical optometry & allied health science (100 hrs )**

### **PART 1**

**Introduction to National Healthcare System 5 hrs**

National Health Programme 5HRS

Medical terminologies and record keeping 5HRS

Communication and soft skills 10 HRS

Introduction to Quality and patient safety 20 HRS

Professionalism and values 3 HRS

Community orientation and clinical visit 20 HRS

Principles of Management 3 HRS

Mathematics 20 hrs

IT , DATA SCIENCE & AI FOR HEALTHCARE 15 HRS



### **PART 2**

**Introduction to National Healthcare System- 5 HRS**

**B.optom/M optom /Community Nurse**

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Topics to be covered under the subject are as follows:

- Healthcare delivery system in India at primary, secondary and tertiary care
- Community participation in healthcare delivery system
- Health system in developed countries.
- Private Sector
- National Health Mission
- National Health Policy
- Issues in Health Care Delivery System in India

### **PART 3**

**National Health Programme - 5HRS**

**B.optom/M optom /Community Nurse**

- Background objectives, action plan, targets, operations, achievements, and constraints in various National Health Programme.

3. Introduction to AYUSH system of medicine

- a. Introduction to Ayurveda.
  - b. Yoga and Naturopathy
  - c. Unani
  - d. Siddha
  - e. Homeopathy
  - f. Need for integration of various system of medicine
4. Health scenario of India- past, present, and future

5. Demography & Vital Statistics.

Demography – its concept

- b. Vital events of life & its impact on demography
- c. Significance and recording of vital statistics
- d. Census & its impact on health policy

**PART 4**

**Medical terminologies and record keeping - 5HRS**

**M.optom /B.optom , MRD experts , Nurse**

This course introduces the elements of medical terminology.

Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes.

Topics include origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.

Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.
9. Data entry and management on electronic health record system.

**PART 5 Communication and soft skills - 10 HRS**

## PG in English or Soft skill trainer

Major topics to be covered under Communication course –

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc.

Basic compositions, journals, with a focus on paragraph form and organization.

4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication
7. Barriers of communication & how to overcome

## PART 6

### Introduction to Quality and patient safety - 20 HRS

#### Nurse , Quality Control experts or Public health experts

1. **Quality assurance and management** - The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.

- a. Concepts of Quality of Care
- b. Quality Improvement Approaches
- c. Standards and Norms
- d. Quality Improvement Tools
- e. Introduction to NABH guidelines

2. **Basics of emergency care and life support skills** - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows: a. Vital signs and primary assessment b. Basic emergency care – first aid and triage c. Ventilations including use of bag-valve-masks (BVMs) d. Choking, rescue breathing methods e. One- and Two-rescuer CPR f. Using an AED (Automated external defibrillator). g. Managing an emergency including moving a patient at the end of this topic, focus should be to teach the students to perform the manoeuvres in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities.

**3. Bio medical waste management and environment safety-** The aim of this section will be to help prevent harm to workers, property, the environment, and the general public. Topics to be covered under the subject are as follows:

- a. Definition of Biomedical Waste
- b. Waste minimization
- c. BMW – Segregation, collection, transportation, treatment, and disposal (including colour coding)
- d. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
- e. BMW Management & methods of disinfection
- f. Modern technology for handling BMW
- g. Use of Personal protective equipment (PPE)
- h. Monitoring & controlling of cross infection (Protective devices)

**4. Infection prevention and control** - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes.

Concepts taught should include –

- a. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
- b. Prevention & control of common healthcare associated infections,
- c. Components of an effective infection control program, and
- d. Guidelines (NABH and JCI) for Hospital Infection Control

**5. Antibiotic Resistance**

- a. History of Antibiotics
- b. How Resistance Happens and Spreads
- c. Types of resistance- Intrinsic, Acquired, Passive
- d. Trends in Drug Resistance
- e. Actions to Fight Resistance
- f. Bacterial persistence
- g. Antibiotic sensitivity
- h. Consequences of antibiotic resistance
- i. Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals

**6. Disaster preparedness and management-** The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should include

- a. Fundamentals of emergency management,
- b. Psychological impact management,

- c. Resource management,
- d. Preparedness and risk reduction,
- e. Key response functions (including public health, logistics and governance, recovery, rehabilitation, and reconstruction), information management, incident command and institutional mechanisms.

## **PART 7 :**

### **Professionalism and values - 5 HRS**

#### **M. Optom , Department HODs, Nurse , Human resource expert**

The module on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant professionalism in terms of healthcare system is and how it affects the overall patient environment.

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behaviour- professional behaviour, treating people equally
4. Code of conduct, professional accountability and responsibility, misconduct
5. Differences between professions and importance of team efforts
6. Cultural issues in the healthcare environment



## **PART 8**

### **Principles of Management - 5 HRS**

#### **M. Optom OR healthcare profession with management background**

The course is intended to provide knowledge about the basic principles of Management.

1. Introduction to management
2. Strategic Management
3. Foundations of Planning
4. Planning Tools and Techniques
5. Decision Making, conflict and stress management
6. Managing Change and Innovation
7. Understanding Groups and Teams
8. Leadership
9. Time Management
10. Cost and efficiency

## **PART 9**

### **Community orientation and clinical visit - 20 HRS**



**Instructor in charge:**

**Optometrist, Nurse or health care professional involved in community or eye care training programmes**

The objective of this section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the undergraduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.

1. The community orientation and clinical visit will include visit to the entire chain of healthcare delivery system -Sub centre, PHC, CHC, SDH, DH and Medical College, private hospitals, dispensaries, and clinics.
2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front-line health workers.
3. Clinical visit to their respective professional department within the hospital.

**Part 10 :**

**Mathematics - 20 hrs**

**PG in mathematics or statistics**

1. Trigonometry: Complex numbers, DeMoivre's Theorem and important deductions, Trigonometric and exponential forms of complex numbers and applications. Expansion of  $\sin q$ ,  $\cos q$  and  $\tan q$  in terms of  $q$ . Algebra: Combinations; Binomial theorem for any index

2. Definition of scalars, vectors and matrices. Addition and subtraction of vectors and matrices; vector norm and matrix determinants. Dot and cross products; angle between vectors. Multiplication of two matrices. Inverse of matrices; solution of simultaneous linear equations using matrices. Concepts of groups, rings and vector spaces.

3. Probability and statistics, Definition of linearity and applications Linear algebra for data science

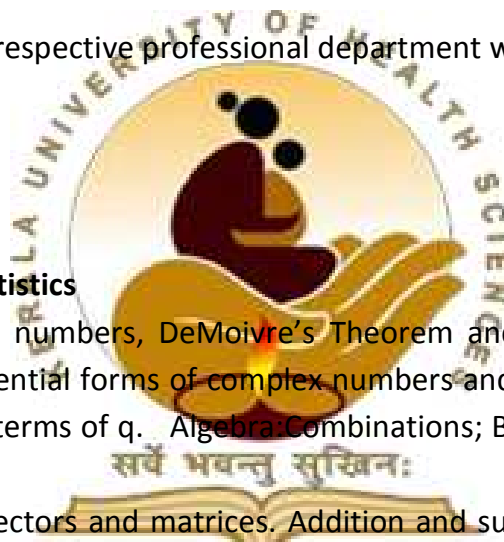
**Text book : Faculty can decide , 11<sup>th</sup> , 12<sup>th</sup> STD Ncert text books**

**Part 11 :**

**IT , DATA SCIENCE & AI FOR HEALTHCARE - 15 HRS**

**Instructor in charge:**

Science Graduate with clinical research background



**Computer graduate / any PG with knowledge of data science and health informatics.**

**Description**

This course offers a systematic introduction to the scope and contents of health data arising from public health and the biomedical sciences. It focuses on rules and techniques for handling health data. Through both regular lectures and guest lectures, this course covers a broad range of health data.

**Learning Objectives**

- To understand the foundation and rules for handling big health data
- To develop a practical knowledge and understanding of important statistical issues and relevant data analytics for health big data analysis
- To understand the basic software and programming skills for data cleaning and data processing

TEXT BOOK: Faculty can decide



**COURSE PLAN**

**Unit Topics Hours**

Computer hardware components, mainframes, mini, micro, desktops, PCs , tablets, Software definition, machine code, higher-level languages, programming as an activity to solve problems, Application software, uploading, downloading, virus and anti virus

Operating systems, concept of file management, files and folders, type of files, image processing , Communication, networking, worldwide web Foundations of & data science: Probability and statistics, Linear algebra for data science, Optimization for data science

Health care systems, types of data in healthcare data literacy Health care data security, compliance and privacy

Expert systems , machine learning, deep learning, Artificial intelligence, applications of AI in other fields

Eye care by ophthalmologists by examining images, typical images examined, DR , AMD, Glaucoma

Anterior examinations, facilitate preliminary screening

Human limitations in image interpretation, image processing software, advantages of machine interpretation, limitations in interpretation, prediction of other diseases using AI eye image interpretation , accuracy and consistency and tracking facilitated

**Practical:**

Fundamentals of computers

1. Learning to use MS office: MS word, MS PowerPoint, MS Excel
2. To install different software.
3. Data entry efficiency
4. Various apps in optometry and AI

## GENERAL ANATOMY

Course Description: 60+10

The Course is designed to enable students to acquire General knowledge of the normal structure of various human body systems and more emphasis given to those relevant for Optometry students .

### 1) Introduction to Anatomical terms organization of the human body- 4 hrs

- a) Microscopic structure of Human cell \*\*
- b) Classification, functions and Microscopic Structures of Primary tissues, epithelial tissue, connective, tissue, muscular tissue, Nervous tissue (With Histology) \*\*
- c) Histology of Cartilage – Hyaline, Elastic, fibro cartilage \*\*

### 2) The Skeletal System - 5 hrs

- a) Classification of bones, constituents of bone and bone tissue. Functions of Skeleton, Microscopic Structure of compact bones. \*\*
- b) Histology: Bone cross section and longitudinal section \*
- c) Organizations of skeleton, Structure of typical vertebrae. \*
- d) Brief study on individual bones: Axial skeleton, appendicular skeleton, cartilages and its classifications. \*
- e) Scapula, Humerus, Radius & ulna, Sacrum, Clavicle, Hip bones, pelvic bones, femur, tibia, fibula\*
- f) Carpel and tarsal bones. \*
- g) Classification of joints\*\*, movements\*, with examples type of ligament \*
- h) Skull bones - Importance of sutures: coronal, sagittal and lamboid, cranial fossae, foramen magnum (elementary knowledge only). Bones of Cranium, Auditory meatus, Mandible and Ramus.\*
- i) Difference between foetal and adult skull. \*\*

### 3) Muscular System - 3 hrs

- a) General function and actions of Nerve supply and blood supply of muscles\*. Classification of muscles\*. Diaphragm. \*
- b) Nerve supply and blood supply of hands and legs. \*\*\*
- c) Histology of Muscle, voluntary or striated, cardiac muscle, Smooth muscle or plane muscle. \*\*

### 4) Respiratory System - 4 hrs



a) Trachea and lungs – Position, relation, structure\*\*\*, and blood supply\*. Broncho-pulmonary segments. Bronchiole, alveoli and muscles of respiration. \*\*

b) Histology of Trachea and lungs\*\*\*

#### **5) Heart - 3 hrs**

a) Position, shape, size, structure, borders, chambers of heart, valves, pericardium\*\*\*, blood supply\* and nerve supply of heart\*,

b) Conducting system of heart\*\*. Arterio-ventricular node.

#### **\*\* 6) Vascular system - 2 hrs**

a) Blood vessels, classification and its structure\*\*\*

b) Differences in the structure of artery and vein. Portal venous system. \*\*\*

c) Histology: Large artery – Aorta, Medium sized artery, Large veins – Inferior vena cava, Medium sized vein\*\*

#### **7) Lymphatic System - 2 hrs**

a) Lymph node, spleen, thymus, tonsil, lymphatic duct.(With Histology) \*\*\*

#### **8) Digestive System - 5 hrs**

a) Oral cavity, salivary glands, teeth, tongue, pharynx, esophagus, stomach \*\*

b) Glands in digestive system, small intestine – duodenum, jejunum, ileum\*\*.

c) Pancreas, liver, gall bladder, gall stone, biliary tract. Large intestine, colon, appendix, rectum-recto-vesical and recto-uterine pouch (With detailed Histological approach) \*\*.

#### **9) Urinary System - 2 hrs**

a) Kidney, nephron\*\*, ureter, urinary bladder and its relation in male and females, urethra. (With detailed Histological approach) \*\*, blood supply\*\*, venous drainage\*\*,

#### **10) Reproductive system - 2 hrs**

a) Male reproductive system\* – testis, seminiferous tubules, epididymis, seminal vesicles, external genitalia of male. (With Histology)\*

b) Female reproductive system – vagina, cervix, uterus, fallopian tubes, ovary, ovarian follicles (With Histology). \*

#### **11) Nervous System\*\*\* 5 hrs**

a) Classification and structure of neurons, brain - parts, ventricles, cranial nerves, spinal cord, spinal nerves.(with Histology)

b) Histology of Neuron, Spinal ganglion, Sympathetic ganglion. Nerve Fibre

c) CNS & ANS

#### **12) Special senses 2 hrs**

Skin - parts, function. (Histology)\*\* b) Olfactory epithelium, taste buds of tongue. \*\*

c) Structure of ear function

#### **13) Endocrine system. 3 hrs**

a) Pituitary glands, thyroid, parathyroid, suprarenal gland. \*\*\*

b) Histology of Pituitary, Thyroid & parathyroid, Adrenal gland and Pancreas. \*\*\*

## Practical

Demonstration of gross anatomy – organs Demonstration of Veins, arteries and nerves in the hands and legs

Demonstration of bones Identification of normal tissues

Human skeleton-parts demonstration

Visit an Anatomy museum

## Text Books

1. Gross Anatomy - Chaurasia vol 1,2,3
2. Histology - I. B .Singh's text book.
3. General Anatomy - Chaurasia.

## General Physiology

### I. ( HAEMATOLOGY-12 HRS)

Introduction, Composition & function of blood, specific gravity, Viscosity Plasma proteins  
1 HR

#### \*\*\*Red Blood Cells 4 HRS

Structure, Normal count, Variations, Properties Hemoglobin  
–normal value, Variations, Structure Abnormal Hbs,  
Erythropoiesis, Factors affecting – Anemia – classification, details of various types of  
Anemia.

#### \*\*White Blood Cells 2HRS

Morphology, Normal total count, differential count, Variations,  
Properties and Functions, Leucopoiesis, Factors affecting.

#### \*\*\*Platelets 1HR

Morphology, Normal count, Variations, Functions of Platelets,Hemostasis – Details,  
Thrombopoiesis

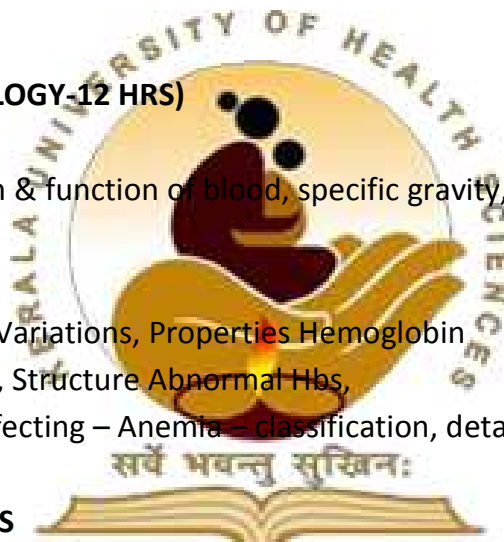
#### \*\*\*Coagulation of Blood 2 HRS

Clotting factors, Intrinsic & Extrinsic mechanisms, Defects in  
Coagulation, Bleeding time, Clotting time, Anticlotting  
mechanisms in the body, Anticoagulants

\*\*\*

#### Blood Groups 1HRS

ABO system, Landsteiner's laws, Importance of cross matching, Blood transfusion, complications  
of mismatched blood transfusion, Rh system, Rh incompatibility



## **\*\*Blood Volume 1HR**

Normal Value, Variations, one method for estimating blood volume, Lymph, Composition, Functions & Formation of Lymph. Starling's hypothesis of tissue Fluid formation, Edema

## **II.( CARDIO VASCULAR PHYSIOLOGY10 HRS)**

**\*\*Functional anatomy, conducting system of heart origin & conduction of Impulses 1HR**

**\*\*\*Cardiac cycle, Various phases, heart sounds ECG 2HR**

### **\*\*\*Cardiac Output**

Definition normal values variations, Regulation of

**\*\*stroke volume – Homometric – heterometric, One method**

To measure Cardiac output 2HRS

### **\*\*Heart Rate 1HR**

Normal value, Variations, regulation of heart rate

### **Arterial Pulse**

#### **\*\*\*Blood Pressure 3 HRS**

Definition, Normal, Value variations, Determinations of Blood pressure, Estimation of Blood pressure, Regulation of Blood pressure, Shock, Compensatory mechanisms in shock

#### **\*\*Regional Circulation 1HR**

Coronary Circulation, Pulmonary Circulation, Cutaneous circulation, Cerebral circulation



## **III. (RESPIRATORY SYSTEM- 8HRS )**

**\*Introduction, Functional anatomy, Respiratory muscles and their actions During Ventilation 1 HR**

\*Intrapleural pressure, Intrapulmonary pressure,

Pressure changes during Respiratory cycle 1HR

\*\*Lung volumes & Capacities 1HR

Respiratory dead space, Pulmonary circulation,

Gas exchange across the Respiratory membrane, Factors affecting diffusion

\*\*\*O<sub>2</sub> transport through blood, Oxygen dissociation Curve, Factors shifting the ODC to right & left Carbondioxide transport 2HRS

\*\*\*Regulation of respiration, a) Neural, b) Chemical, Abnormalities in regulation, Hypoxia, Hypercapnoea Cyanosis, Asphyxia \* artificial respiration 3HRS

#### **IV. GASTROINTESTINAL SYSTEM 8 HRS**

\*\*Functional anatomy, Enteric nervous system, Salivary secretion, Innervation of Salivary glands, Composition & functions of Saliva, Regulation of secretion 2HRS

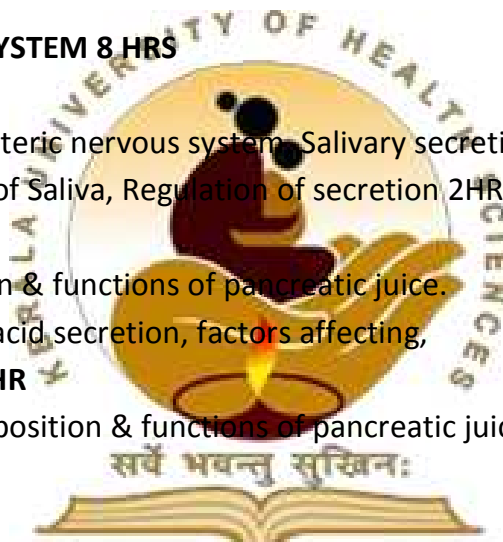
\*\***Gastric secretion 2HRS**

Gastric glands, Composition & functions of pancreatic juice. Regulation, Hydrochloric acid secretion, factors affecting,

\*\***Pancreatic secretion 1HR**

Functional anatomy, composition & functions of pancreatic juice. Regulation of pancreatic secretion

\*\***Liver 1HR**



Functional anatomy, composition & functions of Bile regulation of secretion. Bile salts, Bile pigments, Enterophepatic circulation, Functions of gall Bladder

\*\***Movements of GIT 2HRS**

Mastication, Deglutition – stages, Gastric movements, Small intestinal movements, small intestinal movements,

Movements of large intestine

Defecation reflex,

Abnormalities 1HR

## **V .RENAL PHYSIOLOGY 3HRS**

\*Functional anatomy – Nephron, Renal blood flow,

\*\*\*Glomerular filtration, Factors affecting GFR

Tubular function

\*\***Urinary Bladder 1HR**

Innervation, Mictarition reflex, Cystometrogram, Abnormalities

## **VI. NERVE MUSCLEPHYSIOLOGY**

**5 hr**

\*\*Neuron, Action potential and membrane potential, nerve fibers types, molecular basis and muscle contraction

## **VII. ( PHYSIOLOGY OF CENTRAL NERVOUS SYSTEM 15HRS )**

### **Sensory System**

\*\*Organisation of nervous system, Functional anatomy, Synapse, Synaptic Transmission, Synaptic inhibition, Properties of Synapse 1 HR

\*\*Reflex action – components, Properties, Mono synaptic & Poly synaptic Reflexes, Stretch reflex, Inverse stretch reflex, Receptors – types of Receptors, Receptors potential 1HR

\*\*\*Pathways of sensations from body & face 2HRS

Pain – referred pain, control of pain 1HR

\*\***Thalamus 1HR**

Functional anatomy, connections & functions,

Thalamic Syndrome

\*\***Motor system**

Functional anatomy, Pyramidal tract, Lesions, Differences

between upper Motor & Lower motor neuron lesions 2hrs

\*\***Basal Ganglia 1 hr**

Functional anatomy, connections & functions, Parkinsonism





**\*\*Cerebellum 1 hr**

Gross structure, Histology, connections & functions,  
Cerebellar lesion

**\*\*Limbic System**

Connections & Functions 1 hr  
Reticular formation – connections  
functions, Ascending 1hr  
Reticular Activating system

**\*\*Vertibular apparatus 1hr**

Functional anatomy receptors,  
Connections & Functions

**\*\*Cerebral Cortex 2 hr**

Brodmanns areas, functions,  
\*\*Higher functions –

\*\*Sleep & EEG

\*\*Hypothalamus -

**VIII. ( SPECIAL SENSES 4 hrs )**

**\*\*Olfaction 1 hr**

Olfactory mucosa, Olfactory receptors,  
Olfactory pathway

**\*\*Taste 1 hr**

Receptors – Primary sensations of taste,  
Gustatory pathway

**\*\*Audition 2hrs**

Functional anatomy, functions of middle  
ear, structure of  
Cochlea, Auditory Pathway, Deafness,  
Endocochlear potentials



Speech  
Learning  
Memory  
Connections & Functions, Postural  
reflexes

**OCULAR ANATOMY - 100 HRS (40+40+20)**

NO.	TOPICS	No of hours
1.***	Cornea: Anatomy of all the layers, cellular structure, nerve supply, reason for transparency, refractive properties	2
2.***	Coats of eyeball: 1. Sclera (episclera & limbus) 2. Choroid (Iris, ciliary body, choroid) 3. Retina Detailed anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for pupillary actions, pupillary pathway.	6
3.***	Crystalline lens	2
4.**	Aqueous, anterior chamber, vitreous body	3
5.**	Ocular Embryology	2
6.**	Detailed study of orbit	2
7.**	Ocular Adnexa** and Lacrimal system***	3
8.***	Extra ocular muscles (anatomy, innervations, action)	2
9.**	Orbital Blood supply	2
10.**	CRANIAL NERVES: Detailed study of each of the following nerves in terms of their nuclei, course, relationship within brain, effects of compression etc at different regions 1. Optic nerve*** 2. Oculomotor nerve*** 3. Trochlear nerve ** 4. Trigeminal nerve ** 5. Abducent nerve ** 6. Facial nerve**	10
11.***	Visual Pathway	3
12.*	Autonomic Innervations of Ocular structures	3
	Total Number of Hours (theory)	40
	Tutorial hours (Assignments, Group discussions, Practical tasks)	40

Reference Books:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Fourth edition, CBS Publishers, 2024
2. L A Remington: Clinical Anatomy and physiology of the Visual System, fourth edition, Elsevier 2022

Practical demonstration:(20 hours)

- Identification and labelling of structures, layers and parts of eye
- Discussion on applied anatomy about common diseases of each structure
- Using an Eye model, various slides, charts, seminars and animations for demonstration

OCULAR PHYSIOLOGY 40+40+20

NO.	TOPICS	NO. OF HOURS
1.**	Protective mechanisms in the eye	1
2.***	Precorneal tear film, eyelids and lacrimation	2
3.***	Extrinsic Ocular muscles, their actions and control of their movements	2
4.*	Saccadic, smooth pursuit and Nystagmic eye movements	1
5.***	Corneal Physiology	4
6.***	Aqueous humor and vitreous: Intra ocular pressure	3
7.**	Iris and pupil	2
8.***	Crystalline lens and accommodation	3
9.**	Retina – Metabolism and physiologic activities	1
10.***	Pigments of the eye and photochemistry	4
11.*	Physiology of Vision and general considerations	1
12.**	Light sense- Dark and light adaptations , electrophysiology Sense of contrast	3
13.***	Form sense- Visual acuity, vernier acuity and principle of measurement	3
14.***	Colour vision and colour defects. Theories and diagnostic tests	2
15.***	Binocular vision- Definition, grades and advantages Basic terminologies- visual direction and horopter, panum's area, diplopia, suppression.	3

16.***	Visual pathway,central and cerebral connections, lesions of pathway and effects	2
17.**	The visual stimulus, refractive errors	3
	Total number of Hours	40

Reference Book:

- RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
- PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 12th edition, Mosby, 2024
- AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, F edition, CBS Publishers, New Delhi, 2006

PRACTICAL HOURS

NO.	TOPIC	NO. OF HOURS
1.	Basic Tear Film Assesment Schirmer Test	2
2.	Introduction To Cover Test	2
3.	Demonstration of IOP Measurement	3
4.	Abnormal Pupillary Reflexes Demonstration of miotics, mydriatics, cycloplegics and their effects	3
5.	Demonstration Of Accommodation, Near Point, Range , And Amplitude Of Accommodation Presbyopia	2
6.	Demonstration Of Visual Acuity Charts	2
7.	Demonstration Of Stereoacuity Measurements (TITMUS FLY TEST), optical illusion	2
8.	Demonstration Of Colour Vision Testing Devices(Ishihara)	2
9.	Demonstration Of Contrast Sensitivity Testing Devices ( Pelli Robson Chart)	2
	TOTAL HOURS	20

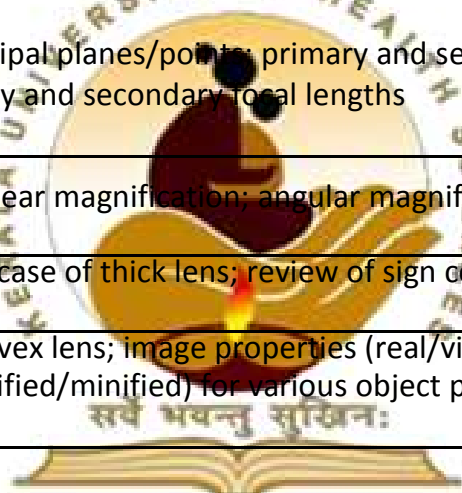


## PHYSICAL AND GEOMETRICAL OPTICS

### GEOMETRICAL OPTICS I

No.	Topics	No of hrs.
**1	Nature of light – introduction of two theories speed of light in vacuum	0.5
***2	Fermat's Principle , laws of reflection and refraction (Snell's law)	4
***3	Refractive index; its dependence on wavelength	1
***4	Plane mirrors – height of the mirror; rotation of the mirror	1
***5	Reflection by a spherical mirror – paraxial approximation; sign convention; derivation of vergence equation	1
***6	Imaging by concave mirror	2
***7	Imaging by convex mirror	2
*8	Reflectivity; transmittivity	0.5
**9	Glass slab; displacement without deviation; displacement without dispersion	2
***10	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism	2
***11	Prisms; angular dispersion; dispersive power; Abbe's number.	2
***12	Thin prism – definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index	1
***13	Definition of crown and flint glasses; materials of high refractive index	2

***14	Refraction by a spherical surface; <i>sign convention</i> ; introduction to spherical aberration using image formed by a spherical surface of a distance object; <i>sag formula</i>	3
***15	Paraxial approximation; derivation of vergence equation	1
**16	Imaging by a positive powered surface	2
**17	Imaging by a negative powered surface	2
*18	Vergence at a distance formula; effectivity of a refracting surface	1
**19	Definition of a lens as a combination of two surfaces; different types of lens shapes.	1
**20	Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths	4
**21	Newton's formula; linear magnification; angular magnification	2
**22	Thin lens as a special case of thick lens; review of sign convention	1
***23	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2



***24	☆ Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
*25	Prentice's Rule	1
***26	System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points. Nodal Planes	2
**27	System of more than two thin lenses; calculation of equivalent power	2
	<b>Total number of Lectures</b>	<b>47</b>

## GEOMETRICAL OPTICS II

**1	Cylindrical Lenses; image formation; relation between cylinder axis and line image orientation	2
**2	Imaging due to two cylinders in contact with axes parallel	1
***3	Two cylinders in contact with axes perpendicular; line images and their orientations to the cylinders' powers; interval of Sturm; circle of least confusion (CLC); spherical equivalent; position of CLC	6
**4	Spherocylindrical lens notations – plus/minus cylinder form, cross cylinder/meridian form; transformations between them	3
**5	Field stops and apertures; entrance and exit pupils Apertures and defocus blur	2
**6	Receiver/detector diameter; depth of focus; depth of field	1
***7	Chromatic Aberrations; methods of removing chromatic aberrations; Abbe number	2
***8	☆ Monochromatic Aberrations – deviation from paraxial approximation; difference between ray aberrations and wavefront aberrations	2
***9	Third order aberrations – spherical aberrations; coma; astigmatism; distortion and curvature of fields Higher order aberrations; introduction to Zernike Polynomials	3
**10	Ways of minimizing spherical aberrations – pupil size, bending of lens, shape factor	2
**11	Lens tilt – astigmatism	1
***12	Telescopes – Keplerian, Galilean and Newtonian; position of cardinal points, entrance and exit pupils; magnifications; advantages and disadvantages	4
**13	Microscopes – magnification; tube length.	2

***14	Gullstrand's Schematic Eye (GSE); calculation of the power of the cornea, the lens and the eye; axial length; calculation of the position of the cardinal points; magnification	2
**15	GSE - Purkinje images and their reflectances	1
**16	GSE - entrance and exit pupils for a 3mm pupil; ocular aberrations – spherical aberrations and coma; chromatic aberrations.	2
***17	GSE – introduction to refractive errors - myopia and hyperopia; corneal curvature; axial length; far point; blur size calculations; corrections; astigmatism; blur size; circle of least confusion; correction.	4
***18	GSE - Object closer than at infinity; introduction to accommodation; far point; near point; presbyopia; spectacle and contact Lens corrections - comparison of magnification	3
	<b>Total number of Lectures</b>	<b>43</b>



**Text book:**

- Tunnacliffe A. H, Hirst J. G, *Optics*, The association of British Dispensing Opticians, London, U.K., 1990.
- Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.

**Reference Books:**

- Loshin D. S. *The Geometric Optics Workbook*, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. *Geometrical and Visual Optics: A Clinical Introduction*, McGraw-Hill, New York, USA, 2002



## Physical Optics

No	Topics	No.of hrs
	Nature of light – light as electromagnetic oscillation – wave equation; ideas of sinusoidal oscillations – simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase, Electromagnetic Spectrum Huygen's Principal, Wavefronts – spherical, elliptical and plane..	
***1	Curvature and vergence; rays; convergence and divergence in terms	7
***2	of rays and vergence at a distance	2
**3	Photometry, units of light measurement	1
**4	Relationship between amplitude and intensity, Inverse square law of photometry; Lambert's law	2
**5	Types of luminescence , Fluorescence and Phosphorescence	1
***6	Polarized light; linearly polarized light; and circularly polarized light.	1
***7	Intensity of polarized light; Malus' Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.	2
**8	Birefringence; ordinary and extraordinary rays.	2
***9	Coherence; interference; constructive interference, destructive interference; fringes; fringe width. Holograms	2
***10	Diffraction; diffraction by a circular aperture; Airy's disc	
***10	Double slits, multiple slits, Diffraction gratings.	3
***11	Resolution of an instrument (telescope, for example); Raleigh's criterion	2
**12	Scattering; Raleigh's scattering; Tyndall effect.	2
***13	Basics of Lasers –properties; population inversion; spontaneous emission; Common Applications.	3
*14	Radiometry; solid angle; radiometric units; photopic and scotopic	3
	luminous efficiency and efficacy curves; photometric units	
	<b>Total number of Lectures</b>	<b>33</b>

### **Practical: (20 hours)**

Each practical session could be evaluated for 10 marks and the total could be added to the final evaluations. These practical's could be customized as per the university requirements and spaced apart conveniently. The practical's to be done include the following:

- Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
- Thin Prism – measurement of deviation; calculation of the prism diopter
- Image formation by spherical mirrors
- Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
- Concave lens – in combination with a convex lens – power determination.
- Construction of a tabletop telescope – all three types of telescopes.
- Construction of a tabletop microscope
- Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
- Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
- Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

**Text Book:** Subrahmanyam N, BrijLal, *A text book of Optics*, S. Chand Co Ltd, New Delhi, India, 2003.

### **Reference Books:**

Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.

Keating NM. P,

*Geometric, Physical and Visual Optics*, Butterworth- Heinemann, Massachusetts, USA, 2002



## **NUTRITION & BIOCHEMISTRY**

### **General Biochemistry, Ocular Biochemistry & Nutrition**

Total Hours – 60 (50+10) (Theory + Practical)

#### **I. Introduction**

#### **\*\*\*II. Carbohydrates - 11 hours**

Chemistry

Glycolysis, HMP shunt pathway; Galactose & Fructose metabolism, Glycogen metabolism; Glycogen storage diseases, TCA cycle, Glycosaminoglycans, Blood sugar and its regulation, GTT; Diabetes mellitus

#### **III. Proteins - 8 hours**

\*Chemistry, Functions,

\*\* Essential Amino acids, Immunoglobulin's, Complete and Incomplete Proteins; Supplementary food, Quality of proteins, Nitrogen Balance,

\*\*\*Urea cycle, Metabolism of amino acids –Tyr., Plasma Proteins

#### **IV. Lipids – 7 hours**

\*\*\*Classification, Beta oxidation,

\*\*Essential fatty acids Fatty acid synthesis, Ketosis, Excess and deficiency – Lipids & Eye, Hyperlipidemias – diseases –Atherosclerosis, Lipoproteins; Prostaglandins.

#### **V. Enzymes – 3hours**

\*\*Classification

\*\*\* Factors affecting enzyme action

\*\*Enzyme inhibition, Diagnostic applications of Hepatic, Cardiac, Pancreas, Born and Muscle Disease

#### **\*\*VI. Nutrition – 6 hours**

Introduction to Nutrition, Food Group and food pyramids.

Energy metabolism – units of energy, Energy value of food, Malnutrition, Balanced diet.

Assessment of nutritional status, role of nutrition in ocular ageing, PEM and Eye, Low birth weight, green leafy vegetables, dietary fibers, measles and eye related disorders.

#### **VII. Vitamins – 5hours**



\*\*\*Vitamin A, Its role in vision & Regulatory mechanisms of Ophthalmologically important vitamins, Vitamin D & K, Vitamin E, Vitamin C.

\*\*Free radicals and antioxidants, B complex vitamins,

### **VIII. Minerals – 3 hours**

\*\*\*Macrominerals (1 hr),

\*\*Microminerals (2 hrs), Fe, Cu, Se, Zn, I

### **IX. Hemoglobin – 1Hours**

\*Heme – synthesis & catabolism (Mention only), Disorders of synthesis –Porphyrins, Jaundice.

### **\*\*X. Buffers, pH of blood, Acid base balance – 1 hour**

### **XI. Ocular Biochemistry – 6 hours**

1. \*Importance of ocular biochemistry in ophthalmic practice
2. \*\*\*Tear film – composition – lipid layer – aqueous layer – mucoid layer – functions
3. \*\*\*Cornea – biochemical composition – corneal metabolism – nutrient uptake – transparency
4. \*\*Lens – composition – metabolism – transparency, cataract formation, Sugar cataracts and medical therapy –
5. \*\*Aqueous humor - composition and function; IOP and Glaucoma
6. \*\*Vitreous humor – composition and function.
7. \*\*Retina – composition – photoreceptor cell – metabolism and functions – phagocytosis – Retinal neurochemistry – Monoamines – acetylcholine – GABA – amino acids – Taurine – neuropeptides – Biochemical correlates.

### **Practicals or Demonstration / Lab visits : 10 hrs**

1. Abnormal constituents of urine
2. Estimation of sugar and protein (demonstration)
3. Electrophoresis & Chromatography (demonstration)
4. Preparation of Phosphate buffer, phosphate buffered saline

### **Reference book**

1. Review of biochemistry (Harper)
2. Textbook of Biochemistry (Dr.M.Vasudevan&Dr.Sreekumari)
3. Textbook of Biochemistry (Thomas.M. Delvin)
4. Human nutrition & Dietetics (Gallon, James, Ralph 10th editing)

2<sup>nd</sup> yr Bsc optometry

**SUBJECT : GENRAL AND OCULAR PHARMACOLOGY**

Objectives

At the end of the course the student shall be able to

1. Describe the pharmacokinetics and pharmacodynamics of commonly used ocular Drugs.
  2. Describe the Toxicology of ocular therapeutic agents
  3. List the indications and contraindications of Ocular drugs
  4. Enumerate the drug delivery strategies in Ophthalmic drug use
  5. State the diagnostic application of drugs in Ophthalmology Skill
- 
1. Recognize adverse reactions
  2. Communication skill
  3. Observe experiments designed for the study of ocular drugs and interrupt them.
  4. Scan information on common ocular pharmaceutical preparations.

Syllabus

I. General Pharmacology Hours

- a) Mechanism of drug action 1
- b) Pharmacokinetics of ocular drugs 2
- c) Factors influencing penetration of ocular drugs 1
- d) Adverse drug reactions 1
- e) Toxicology of ocular therapeutic agents 1
- f) Routes of ocular administration 1
- g) Vitamins and Zinc deficiencies 1

II Action of specific agents

1. CNS depressants 1
2. Anticoagulants, Surgical haemostasis and thrombolytic agents 2
3. Diuretics and hypertensive agents 2
4. Drugs used in cardiac failure, angina and shock 3
5. Histamines, antihistamines and mast cell stabilizers 2
6. Antidepressants 1
7. Prostaglandins and Serotonin 1
8. Ocular toxicity of some systemic drugs 1

### III Ophthalmological drug use

1. Antiglaucoma drugs 3
  - a) Drugs which increase the outflow of aqueous humour
  - b) Drugs which decrease the production of aqueous humour by the ciliary body
  - c) Ocular hypotensives
2. Topical antibacterial agents for ophthalmic use 1
3. Antifungal agents for ophthalmic use 1
4. Antiviral agents for ophthalmic 1
5. Therapeutic and diagnostic use of autonomic drugs 2
6. Antiprotozoal agents and antiallergics 1
7. Anti inflammatory agents like glucocorticoids and NSAIDS 1
8. Mydriatics and miotics 1
9. Topical Local anaesthetics 2
10. Miscellaneous drugs like Tear substitutes and Wetting Agents Diagnostic agents – Fluorescein and Rose Bengal 1  
Antiseptics – Povidone iodine preservatives in ocular Preparations
11. BLS & emergency care 2

Total 37 Hrs.

Text Books Recommended



- ☐ Pharmacology and Pharmacotherapeutics, R.S. Sathoskar and S.D. Bhandarkar 19<sup>th</sup> Edition
- ☐ Essential of Medical Pharmacology, K.D. Tripathi, 5th Editon, Jaypee Brothers, New Delhi.
- ☐ K D TRIPATHI: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi,2004

**Subject : Microbiology , Theatre & Sterlization techniques**

**1. Introduction and general microbiology – 10 hrs**

- Morphology and physiology(\*\*\*)
- Culture media and culture methods(\*\*)
- Antibiotic sensitivity testing and rationale of use(\*\*)
- Sterilisation and disinfection (\*\*\*)
- Infection and epidemiology(\*\*)
- Addition- Standard precautions(\*\*)

**2. Immunology 5hrs**

- Antigen, antibody(\*\*)
- Serological tests (\*\*)
- Hypersensitivity (\*\*\*)
- Autoimmune diseases of eye(\*\*)
- Addition- immunity(\*\*\*)
- Deletion- structure and function of immune system

**3. Systematic bacteriology 15 hrs**

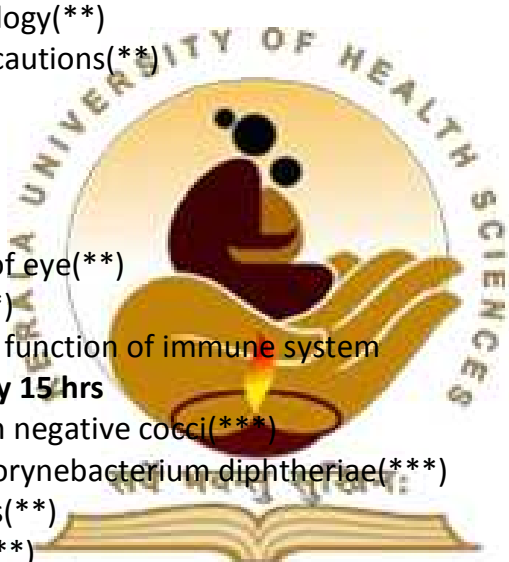
- Gram positive and gram negative cocci(\*\*\*)
- Gram positive bacilli- Corynebacterium diphtheriae(\*\*\*)
- Clostridium and bacillus(\*\*)
- Gram negative bacilli(\*\*\*)
- Mycobacterium (\*\*\*)
- Actinomycetes and Nocardia (\*\*)
- Addition - Chlamydia

**4. Virology 10 hrs**

- Introduction, morphology, microscopy, mode of transmission, cultivation(\*\*)
- Herpes, Adeno, HIV, Hepatitis viruses(\*\*\*)
- Paramyxovirus, Picorna, papilloma(\*\*)
- Poxvirus(\*)
- Covidology \*

**5. Mycology 4hrs**

- Addition- introduction, morphological and clinical classification (\*\*)
- Opportunistic mycoses(\*\*\*)
- Systemic mycoses(\*\*)
- Superficial and subcutaneous (\*)
- Antifungals(\*)



## 6. Parasitology and entomology 6hrs

- free living amoebae (\*\*\*)
- Toxoplasmosis (\*\*\*)
- Ocular filariasis (\*\*\*)
- Scabies, head and body lice (\*\*)

## 7. Applied microbiology\*2 hrs

## 8. THEATRE TECHNIQUES & STERILIZATION TECHNIQUES 5hrs

- Staffing and categories of people in OT\*
- Physical set up and general function of OT\*
- Operation table, anesthetic table, preparation of eye pad, cotton swab\*
- General procedures, setting up of sterile trolley, scrubbing gowning, gloving\*
- Sterilization and disinfection-Boiling, autoclaving dry heat, chemical disinfection\*\*
- Surgical instruments- general and ophthalmic, specifications and use of ophthalmic surgical instruments.\*\*
- Cleaning and maintenance of surgical instruments\*

### Practical/Demonstration: 10 hrs

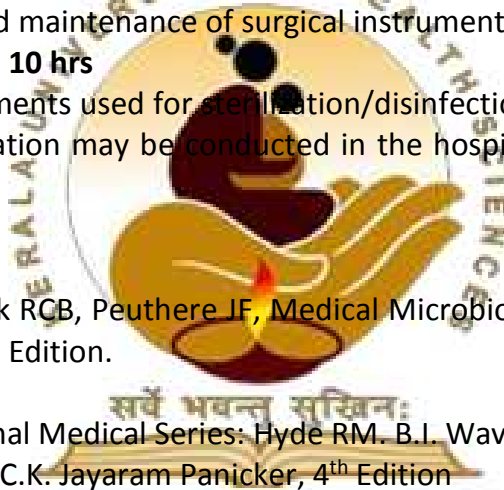
Culture media and instruments used for sterilization/disinfections may be borrowed from the hospital lab or demonstration may be conducted in the hospital by arranging visit to sterile department and wards.

### Prescribed Books:

1. Greenwood. D, Slack RCB, Peuthere JF, Medical Microbiology 15<sup>th</sup> Edition 2000; Churchill Livingstone ELBS Edition.

### Reference Books:

2. Immunology (National Medical Series: Hyde RM. B.I. Waverly Pvt. Ltd. Textbook of Parasitology. C.K. Jayaram Panicker, 4<sup>th</sup> Edition



## SUBJECT : GENERAL & OCULAR PATHOLOGY

### a) AIM

Aim of teaching Pathology for B.Sc. Optometry students is to provide the students with a comprehensive knowledge of the mechanism and cause of disease process, in order to enable him/her to achieve an understanding of the natural history and clinical manifestation of the disease.

### 1. OBJECTIVE

#### a) Knowledge



At the end of the course, the student shall be able to

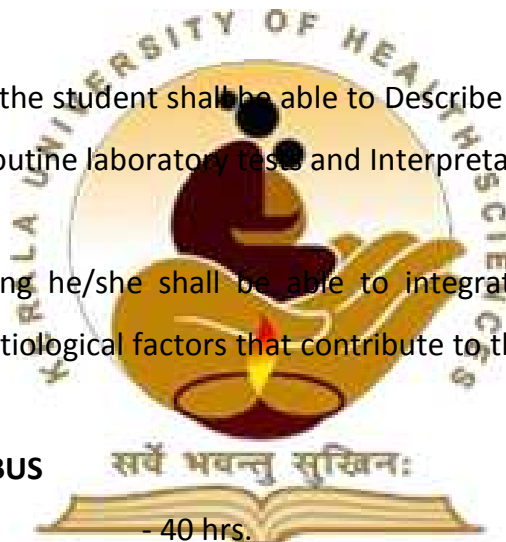
- i. Describe the mechanism of cell death, the degeneration, cellular adaptation, patterns of tissue response to cellular injury and repair and be able to correlate structural and functional alternations.
- ii. Explain the Pathophysiological processes which govern the maintenance the Homeostasis, Mechanism of their disturbance and morphological and clinical Manifestations associated with
- iii. Describe the etiopathogenesis and morphological changes of common infections and neoplastic processes.
- iv. Describe the pathological findings on common ocular diseases.

**b) Skill**

At the end of the course, the student shall be able to Describe the rationale and principle of technical procedures of routine laboratory tests and Interpretations of the results.

**c) Integration**

At the end of the training he/she shall be able to integrate the cause of disease and relationship of different etiological factors that contribute to the natural history of common diseases.



**2. DETAILED SYLLABUS**

- Total number of Lectures - 40 hrs.  
Number of hours for Demonstration - 20 hrs.  
**Total - 60 hrs.**

**SYLLABUS OF THEORY CLASSES**

Topic	Hours
*Introduction and Etiology	1
***Cell injury- Necrosis, Gangrene	
***Apoptosis, Disturbances of metabolism	3
***Inflammation and repair,	
**Wound Healing	4

Circulatory disturbances	8
**Hyperemia and Congestion	
***Shock	
**Edema	
***Thrombosis	
**Embolism	
**Infraction	
***Neoplasia	5
Definitions, Classifications, Behaviour of benign and Malignant Neoplasm	
Spread of Tumors, Etiopathogenesis, Diagnostic methods	
***Hematology	
Introduction and RBC disorders	3 WBC disorders,
Plasma cell dyscrasia	3
Bleeding and coagulation disease	3
**Clinical Pathology	
Introduction	
Functioning of laboratory	1
Collection of blood sample	
Hematology Technique	1
Examination of Urine	1
**Ocular Pathology	7
Infection	
Degenerative conditions	
Ocular manifestation in systemic diseases, Cataract, Retinoblastoma	



CLINICAL EXAMINATION OF VISUAL SYSTEMS & INSTRUMENTS

NO.	TOPICS	NO. OF HOURS
1.	<b>REFRACTIVE INSTRUMENTS</b> <ul style="list-style-type: none"> <li>• Optotypes ***</li> <li>• CSF, MTF, Spatial Frequency *</li> <li>• Test charts standards. ***</li> <li>• Choice of test charts ***</li> <li>• Trial case lenses *</li> <li>• Refractor (phoropter) head units***</li> <li>• Optical considerations of refractor units*</li> <li>• Trial frame design **</li> <li>• Near vision difficulties with units and trial frames**</li> <li>• Projection charts*</li> <li>• Illumination of the consulting room.*</li> <li>• Brightness acuity test **</li> <li>• Pupilometer *</li> <li>• Potential Acuity Meter**</li> <li>• Abberometer**</li> </ul>	10
2.***	<b>Retinoscope</b> <ul style="list-style-type: none"> <li>• Retinoscope -types available</li> <li>• Adjustment of Retinoscopes- special features</li> </ul>	2
3.***	<b>OPHTHALMOSCOPES AND RELATED DEVICES</b> <ul style="list-style-type: none"> <li>• Design of ophthalmoscopes</li> <li>• Illumination</li> <li>• Design of ophthalmoscopes- viewing</li> <li>• Ophthalmoscope disc</li> <li>• Filters for ophthalmoscopy</li> <li>• Indirect ophthalmoscope</li> </ul>	3
4.**	Lensometer, Lens gauges or clock	2
5.***	Slit lamp	3
6.***	Tonometers and tonometry	3
7.**	Gonioscopes & gonioscopy	2
8.***	Keratometer and corneal topography	2
9.**	Orthoptic instruments( synoptophore only)	1
10.**	Color vision testing devices	1
11.***	Field of vision and screening devices	2
12.***	Scans( A Scan, B Scan) IOL Master& Biometry	3
13.**	Ocular electrodiagnostics( ERG, EOG,VEP)	3
14.**	Basics of other instruments-	3

	Anterior segment diagnostics; <ul style="list-style-type: none"> <li>▪ Pachymetry</li> <li>▪ Confocal microscopy</li> <li>▪ Specular microscopy</li> <li>▪ Anterior segment OCT</li> </ul> Posterior segment diagnostics; <ul style="list-style-type: none"> <li>▪ Posterior segment OCT</li> <li>▪ Fundus camera, FFA</li> </ul>	
	TOTAL NO. OF HOURS	40

Reference books:

- P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo-Optical Instrumentation, 2002
- G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997
- David Henson: Optometric Instrumentations, Butterworth- Heinnemann, UK, 1991



CLINICAL EXAMINATION OF VISUAL SYSTEMS

PRACTICALS

NO.	TOPICS	NO. OF HOURS
1.***	History taking,	2
2.***	Visual acuity estimation Photostress test	1
3.***	Extraocular motility, Cover test, Alternating cover test Saccades and Pursuits	2
4.*	Hirschberg test, Krimsky and modified krimsky	1
5.***	Pupils Examination	1
6.**	Maddox Rod, Maddox wing	1
7.**	External examination of the eye, Lid Eversion and ROPLAS	1
8.***	Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer)	2
9.**	Stereopsis	1
10.***	Confrontation test, HFA interpretation, Amsler test, Bjerrum screen	3
11.***	Slitlamp biomicroscopy,	3

12.***	Direct Ophthalmoscopy,	1
13.**	Corneal Sensitivity, HVID	1
	TOTAL NO. OF HOURS	20

Reference books:

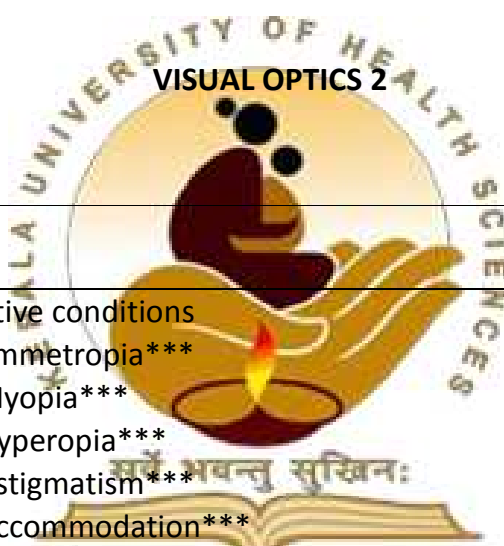
- T Grosvenor: Primary Care Optometry, 5th edition, Butterworth – Heineman, USA, 2007.
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition, Butterworth Heinemann, 2007
- J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins,1991
- N B. Carlson , DI Kurtz: Clinical Procedures for Ocular Examination ,3rd edition, Mc GrawHill Medical, 2003

**SUBJECT : VISUAL OPTICS 1 & 2**

**PREREQUISITES:- Geometrical optics, vergence and power Physical optics, Ocular Physiology**

	<b>1. REVIEW OF GEOMETRICAL OPTICS</b> 1.1 Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Birefringence, Dichroism** 1.2 Aberration and application Spherical and Chromatic*	2 hours
	<b>2.OPTICS OF OCULAR STRUCTURE</b> 2.1 Cornea and aqueous** 2.2 Crystalline lens** 2.3 Vitreous** 2.3 Schematic and reduced eye***	2 hours
	<b>3.MEASUREMENTS OF OPTICAL CONSTANTS OF THE EYE</b> 3.1 Corneal curvature and thickness* 3.2 Keratometry* 3.3 Curvature of the lens and ophthalmophakometry* 3.4 Axial and axis of the eye** 3.5 Basic Aspects of Vision. • Visual Acuity**	5 hours

	<ul style="list-style-type: none"> <li>• Light and Dark Adaptation**</li> <li>• Color Vision**</li> <li>• Spatial and Temporal Resolution*</li> <li>• Science of Measuring visual performance and Application to Clinical Optometry*</li> </ul>	
	<p>4. REFRACTIVE ANOMALIES AND THEIR CAUSES</p> <p>4.1 Etiology of refractive anomalies***</p> <p>4.2 Contributing variability and their ranges*</p> <p>4.3 Populating distributions of anomalies.*</p> <p>4.4 Optical component measurements**</p> <p>4.5 Growth of the eye in relation to refractive errors**</p>	3 hours
	<b>total</b>	<b>12</b>



	Topic	No. of hours
	<p>1.Refractive conditions</p> <ul style="list-style-type: none"> <li>• Emmetropia***</li> <li>• Myopia***</li> <li>• Hyperopia***</li> <li>• Astigmatism***</li> <li>• Accommodation***</li> <li>• Presbyopia***</li> <li>• Anisometropia and Aniseikonia**</li> <li>• Aphakia and Pseudophakia***</li> </ul>	9 hours
	<p>2.Accommodation</p> <ul style="list-style-type: none"> <li>• Far and near points of accommodation**</li> <li>• Correction of spherical ametropia**</li> <li>• Axial versus refractive ametropia**</li> <li>• Relationship between accommodation and convergence, AC / A ratio***</li> </ul>	4 hours
	<p>3.Objective refraction</p> <ul style="list-style-type: none"> <li>• Streak Retinoscopy ***</li> <li>• Principle, Procedure, Difficulties and interpretation of findings***</li> </ul>	5 Hours

	<ul style="list-style-type: none"> <li>• Dynamic retinoscopy various methods***</li> <li>• Radical retinoscopy and near retinoscopy***</li> <li>• Cycloplegic refraction***</li> </ul>	
	<p>4. Subjective Refraction</p> <ul style="list-style-type: none"> <li>• Subjective Refraction:***</li> <li>• Principle and fogging***</li> <li>• Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and block test),J.C.C***</li> </ul> <p>Duochrome test</p> <ul style="list-style-type: none"> <li>• Binocular balancing- alternate occlusion, prism dissociation, Borish dissociated fogging***</li> <li>• Binocular refraction-Variou techniques***</li> </ul>	7 hours
	<p>Effective Power &amp; Magnification :</p> <ul style="list-style-type: none"> <li>• Ocular refraction vs. Spectacle refraction**</li> <li>• Spectacle magnification vs. Relative spectacle magnification**</li> <li>• Axial vs. Refractive ametropia, Knapp's law**</li> <li>• Ocular accommodation vs. Spectacle accommodation**</li> <li>• Retinal image blur-Depth of focus and depth of field**</li> </ul>	3 hours
	Total no. of hours	28



#### Reference Books:

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1993
2. AG Bennett & RB Rabbets: Clinical Visual optics, 4<sup>th</sup> edition, Butterworth Heinemann, 2007
3. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
4. HL Rubin: Optics for clinicians, 3rd edition, Triad publishing company. Florida, 1993.
5. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2<sup>nd</sup> edition, Butterworth, UK, 1982

#### Practical – 20 hours

1. Tests for accommodation-NPA (push up method, pull away method), minus lens method
2. Accommodative facility test

3. Relative accommodation -NRA, PRA
4. Measurement of AC/A ratio- Heterophoric ad gradient method
5. Retinoscopy -static and dynamic
6. Subjective refraction of spherical power & astigmatism
7. Binocular balancing method
8. Presbyopic correction

### OPTOMETRIC OPTICS 1& 2

**(TOTAL 67 hrs)**

Prerequisites: Aberrations, Prisms, reflection, refraction, types of lenses, physical and geometrical optics

#### PART – 1

SL NO	TOPIC	NO OF LECTURES
1	*Introduction ⇒ Light, Mirror, Reflection, Refraction and Absorption	1
2	**Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms	3
3	**Lenses – Definition, units, terminology used to describe, form of lenses	2
4	**Vertex distance and vertex power, Effectivity calculations	2
5	**Lens shape, size and types i.e. spherical, cylindrical and Sphero-cylindrical	1
6	**Transpositions – Simple, Toric and Spherical equivalent	1
7	**Prismatic effect, centration, decent ration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses	3
8	**Spherometer & Sag formula, Edge thickness calculations	3
9	*Magnification in high plus lenses, Minification in high minus lenses	1
10	*Tilt induced power in spectacles	1
11	*Aberration in Ophthalmic Lenses	1
	<b>TOTAL</b>	<b>19 HRS</b>



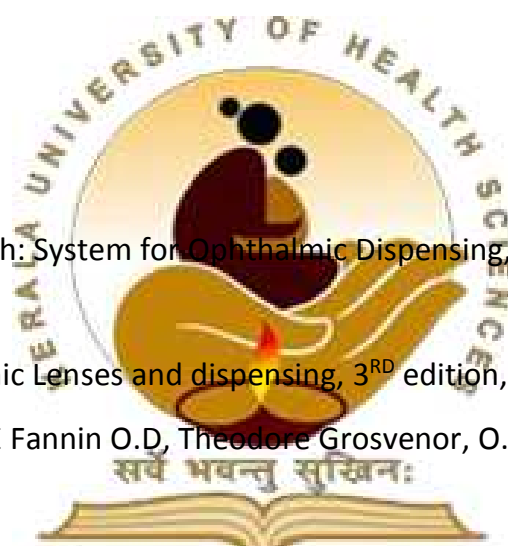
## PART 2

SL NO	TOPIC	NO OF LECTURES
1	***Raw materials – History and General Outline, Manufacturing of Ophthalmic Blanks – Glass & Plastics, Terminology used in Lens Workshops, Surfacing process from Blanks to lenses	4
2	***Definition & Materials (Glass, Plastics, Polycarbonate, Triology) types and Characteristics	3
3	**Properties (Refractive index, specific gravity, UV cut off, impact resistance –include drop ball test, abbe value, Center thickness)	3
4	**Best form of lenses & Safety standards for Ophthalmic lenses (FDA, ANSI, ISI, Others)	2
5	**Design of High-Powered Lenses Hi-index lenses, Calculation of Refractive index	2
6	***Bifocal designs, their manufacturing & uses (Kryptok, Univis D, Executive, Invisible, Occupational)	5
7	***Progressive Addition Lenses, modified near vision lenses (designs, advantages, limitations)	3
8	***Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating)	3
9	**Lens defects – Description and Detection	2
10	**Glazing & edging (manual & automatic)	2
11	***Special lenses <ul style="list-style-type: none"><li>• Lenticulars</li><li>• Aspherics</li><li>• Fresnel lenses &amp; Prisms</li><li>• Aniseikonic lenses</li></ul>	5

	<ul style="list-style-type: none"> <li>• Photochromics</li> <li>• Polaroids</li> <li>• Tinted lenses – Tints, filters</li> </ul>	
12	***History of Spectacles, manufacturing overview, Definition, parts & measurements	4
13	***Classification of frames – Materials (cover in detail), Colours and Temple position (advantages & disadvantages, where to use)	3
14	** Special purpose frames (sports, kids, reading)	1
	<b>TOTAL</b>	<b>42 HOURS</b>

*Reference Books:*

- C V Brooks, IM Borish: System for Ophthalmic Dispensing, Fourth edition, Butterworth-Heinemann, 2023
- M O Jalie: Ophthalmic Lenses and dispensing, 3<sup>RD</sup> edition, Butterworth-Heinemann 2007
- Clinical optics Troy E Fannin O.D, Theodore Grosvenor, O.D,PhD ,Butterworths



**PRACTICAL HOURS -20**

1. Lens type identification (convex,concave) -1 hr
2. Magnification and minification in plus and minus lens – 1hr
3. Lens shape, frame shape identification – 1 hr
4. Hand neutralization (Sphere, Cylinder, Sphero-cyl) - 2
5. Lensometry (Sphere, Cylinder, Sphero-cyl) – 2 hrs
6. IPD measurement (pupillometer and ipd ruler) - 2 hrs
7. Bifocal segment measurement and marking – 2 hrs
8. Progressive lens marking – 2 hrs
9. Optic centre marking -1 hr
10. Calculations – vertex distance, prismatic effect -3hrs

11. Visit to optical lens manufacturing labs -3 hrs

BSC OPTOMETRY

**SUBJECT : EYE DISEASES 1 &2**

PREREQUISITES: Applied Anatomy and Clinical Examination of Each Systems

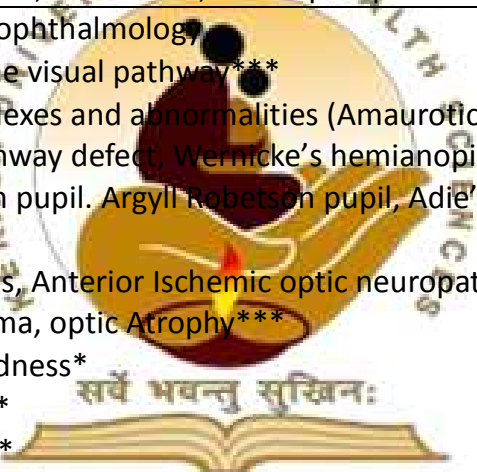
**Eye disease part 1 (chapter 1-6 )**

**Eyedisease part 2 (chapter 7-11)**

	<p><b><u>1.</u></b> orbit</p> <ul style="list-style-type: none"> <li>● Proptosis</li> <li>● Classification,Causes,Investigations)***</li> <li>● Enophthalmos**</li> <li>● Developmental Anomalies *( craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleftsyndrome)</li> <li>● Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis,***</li> <li>● cavernous sinus Thrombosis)** सुखिनः</li> <li>● Grave's Ophthalmopathy***</li> <li>● Orbital tumors( Dermoids, capillary haemangioma, Optic nerve glioma) *</li> <li>● Orbital blowout fractures **</li> <li>● Orbital surgery (Orbitotomy)*</li> <li>● Orbital tumors*</li> <li>● Orbital trauma*</li> <li>● Approach to a patient with proptosis***</li> </ul>	<b><u>10</u></b>
	<p><b><u>2.</u></b> LIDS</p> <ul style="list-style-type: none"> <li>● Congenital anomalies*( Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos)</li> <li>● Oedema of the eyelids(Inflammatory, Solid, Passive edema)***</li> <li>● Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion,Internal hordeolum,,Molluscum Contagiosum)</li> </ul>	<b>6</b>

	<p>Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion,***</p> <ul style="list-style-type: none"> <li>● Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm,**</li> <li>● Ptosis).***</li> <li>● Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamouscell carcinoma, sebaceous gland melanoma)*</li> </ul>	
	<p>3. LACRIMAL SYSTEM</p> <ul style="list-style-type: none"> <li>● The Dry Eye ( Sjogren’s Syndrome)***</li> <li>● The watering eye ( Etiology, clinical evaluation)***</li> <li>● Dacryocystitis**</li> <li>● Swelling of the Lacrimal gland ( Dacryoadenitis)***</li> </ul>	4
	<p>4. CONJUNCTIVA</p> <ul style="list-style-type: none"> <li>● Inflammations of conjunctiva ( Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis)***</li> <li>● Degenerative conditions ( Pinguecula, Pterygium, Concretions)**</li> <li>● Symptomatic conditions ( Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration)**</li> <li>● Cysts and Tumors*</li> </ul>	4
	<p>5. CORNEA</p> <ul style="list-style-type: none"> <li>● Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)*</li> <li>● Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative***</li> <li>● Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic)***</li> <li>● Degenerations ( classifications, Arcus senilis, Vogt’s white limbal girdle, Hassalhenle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann’s nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration)**</li> <li>● Dystrophies ( Reis Buckler dystrophy, Recurrent corneal erosion syndrome, Granualrdystrophy, Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch’s epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy)**</li> <li>● Keratoconus, Keratoglobus***</li> <li>● Corneal oedema, Corneal opacity, Corneal vascularisation**</li> <li>● Penetrating Keratoplasty*</li> </ul>	12

	<p>6. UVEAL TRACT AND SCLERA</p> <p>Applied Anatomy, Classification of uveitis Etiology Pathology Anterior Uveitis Posterior Uveitis Purulent Uveitis Endophthalmitis Panophthalmitis</p> <ul style="list-style-type: none"> <li>• ☑ Pars Planitis</li> <li>• ☑ Tumors of uveal tract( Melanoma)*</li> <li>• ☑ Episcleritis and scleritis**</li> <li>• ☑ Clinical examination of Uveitis and Scleritis</li> </ul>	10
	total	47
	<p>7. Retina and Vitreous:</p> <ul style="list-style-type: none"> <li>• Congenital and Developmental Disorders ( Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery)*</li> <li>• Inflammatory disorders ( Retinitis: Acute purulent , Bacterial, Virus, mycotic)**</li> <li>• Retinal Vasculitis ( Eales's)**</li> <li>• Retinal Artery Occlusion ( Central retinal Artery occlusion)***</li> <li>• Retinal Vein occlusion ( Ischaemic, Non Ischaemic , Branch retinal vein occlusion)***</li> <li>• Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations***</li> <li>• Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration.***</li> <li>• Retinal Detachment: Rhegmatogenous, Tractional, Exudative)***</li> <li>• Retinoblastoma***</li> <li>• Diabetic retinopathy and hypertensive retinopathy***</li> </ul>	12
	<p>8. Ocular Injuries:</p> <ul style="list-style-type: none"> <li>• Terminology : Closed globe injury ( contusion, lamellar laceration) Open globe injury ( rupture, laceration, penetrating injury, perforating injury)***</li> <li>• Mechanical injuries ( Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis)***</li> </ul>	4

	<ul style="list-style-type: none"> <li>• Non Mechanical Injuries ( Chemical injuries, Thermal, Electrical,Radiational)***</li> <li>• Clinical approach towards ocular injury patients*</li> </ul>	
	<p>9. Lens</p> <ul style="list-style-type: none"> <li>• Clinical examination</li> <li>• Classification of cataract***</li> <li>• Congenital and Developmental cataract</li> <li>• Acquired ( Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic)</li> <li>• Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar.</li> <li>• Management of cataract ( Non surgical and surgical measures; preoperative evaluation, Types of surgeries,)**</li> <li>• Complications of cataract surgery**</li> <li>• Displacement of lens: Subluxation, Displacement**</li> <li>• Lens coloboma, Lenticonus, Microspherophakia.*</li> </ul>	10
	<p>10. Clinical Neuro-ophthalmology</p> <ul style="list-style-type: none"> <li>• Lesions of the visual pathway***</li> <li>• Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robertson pupil, Adie's tonic pupil)**</li> <li>• Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic Atrophy***</li> <li>• Cortical blindness*</li> <li>• Malingering*</li> <li>• Nystagmus**</li> <li>• Clinical examination**</li> </ul> 	12
	<p>11. Glaucoma</p> <ul style="list-style-type: none"> <li>• Clinical Examination **</li> <li>• Definitions and classification of glaucoma***</li> <li>• Pathogenesis of glaucomatous ocular damage***</li> <li>• Congenital glaucomas***</li> <li>• Primary open angle glaucoma***</li> <li>• Ocular hypertension**</li> <li>• Normal Tension Glaucoma**</li> <li>• Primary angle closure glaucoma ( Primary angle closure suspect,Intermittentglaucoma, acute congestive, chronic angle closure)***</li> <li>• Secondary Glaucomas***</li> <li>• Management : common medications, laser intervention and surgicaltechniques***</li> </ul>	10

total	45
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1) Reference Books:

- A K Khurana: Comprehensive Ophthalmology, 9th edition, New age international (p) Ltd.Publishers, New Delhi, 2023
- Stephen J. Miller : Parsons Diseases of the Eye, 24th edition, Churchill Livingstone, 2023
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 9th edition, Butterworth - Heinemann, 2019

Practical -20 hours ;

Case Sheet analysis of anterior and posterior segment diseases and conditions

Postings : Observation/postings in community ophthalmology , general ophthalmology , cataract , retina and glaucoma clinics

Observations /postings in investigation, pre and post surgical rooms/wards

**BINOCULAR VISION 1& 2**

**PREREQUISITES:** Ocular anatomy & Physiology



**BV PART 1**

	Topic	NO OF HOURS
**	1. Binocular Vision and Space perception. <ul style="list-style-type: none"> <li>• Relative subjective visual direction.</li> <li>• Retino motor value</li> <li>• Grades of BSV</li> <li>• SMP and Cyclopean Eye</li> <li>• Correspondence,</li> <li>• Fusion, Diplopia, Retinal rivalry</li> <li>• Horopter</li> <li>• Physiological Diplopia and Suppression</li> <li>• Stereopsis, Panum's area, BSV.</li> <li>• Stereopsis and monocular clues - significance.</li> <li>• Egocentric location, clinical applications.</li> </ul>	6

	<ul style="list-style-type: none"> <li>Theories of Binocular vision.</li> </ul>	
**	<p>2. Near Vision Complex Accommodation</p> <ul style="list-style-type: none"> <li>Definition and mechanism (process).</li> <li>Methods of measurement.</li> <li>Stimulus and innervation.</li> <li>Types of accommodation.(***)</li> <li>Anomalies of accommodation – aetiology and management.(***)</li> </ul>	5
***	<p>3. Convergence</p> <ul style="list-style-type: none"> <li>Definition and mechanism.</li> <li>Methods of measurement.</li> <li>Types and components of convergence - Tonic, accommodative, fusional, proximal.</li> <li>Anomalies of Convergence – aetiology and management</li> </ul>	5
**	4.Sensory adaptations Confusion (introduction)	1
**	<p>5. Suppression Investigations</p> <ul style="list-style-type: none"> <li>Management Blind spot syndrome</li> </ul>	4
**	<p>6. Abnormal Retinal Correspondence</p> <ul style="list-style-type: none"> <li>Investigation and management Blind spot syndrome</li> </ul>	1
**	<p>7. Abnormal Retinal Correspondence</p> <ul style="list-style-type: none"> <li>Investigation and management Blind spot syndrome</li> </ul>	1
**	<p>8. Eccentric Fixation</p> <ul style="list-style-type: none"> <li>Investigation and management</li> </ul>	4
***	<p>9. Amblyopia Classification</p> <ul style="list-style-type: none"> <li>Aetiology Investigation Management</li> </ul>	3
	Total	30

## BINOCULAR VISION 2

	Topic	No of hours
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	1 Neuro-muscular anomalies Classification and etiological factors	1
***	2 Convergent strabismus <ul style="list-style-type: none"> <li>• Accommodative convergent squint</li> <li>• Classification</li> <li>• Investigation and Management</li> <li>• Non accommodative Convergent squint</li> <li>• Classification</li> <li>• Investigation and Management</li> </ul>	4
***	3 Divergent Strabismus <ul style="list-style-type: none"> <li>• Classification</li> <li>• A&amp; V phenomenon</li> <li>• Investigation and</li> <li>• Management</li> </ul>	3
**	4 Vertical strabismus <ul style="list-style-type: none"> <li>• Classification</li> <li>• Investigation and</li> <li>• Management</li> </ul>	1
***	5 Paralytic Strabismus <ul style="list-style-type: none"> <li>• Acquired and Congenital</li> <li>• Clinical Characteristics</li> <li>• Distinction from comitant and restrictive Squint</li> </ul>	3
***	6 Investigations <ul style="list-style-type: none"> <li>• History and symptoms</li> <li>• Head Posture</li> <li>• Diplopia Charting</li> <li>• Hess chart</li> <li>• PBCT</li> <li>• Nine directions</li> <li>• Binocular field of vision</li> </ul>	12
***	7 Non surgical Management of Squint ,latest vision therapy and computed software's	2
***	8 Restrictive Strabismus Features <ul style="list-style-type: none"> <li>• Musculofacial anomalies</li> <li>• Duane's Retraction syndrome</li> <li>• Clinical features and management</li> </ul>	3

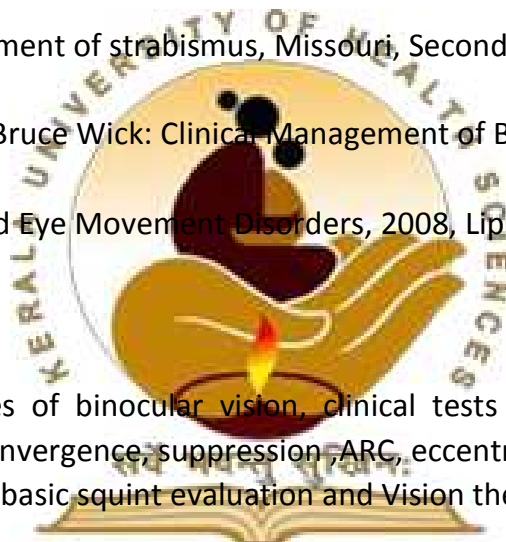
	<ul style="list-style-type: none"> <li>• Brown's Superior oblique sheath syndrome</li> <li>• Strabismus fixus</li> <li>• Congenital muscle fibrosis</li> </ul>	
*	9.Surgical management	1
	Total	30

#### Reference Books

1. Pradeep Sharma: Strabismus simplified, New Delhi, second edition, 2013, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, third edition, 2012, Blackwell Science Ltd
3. Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility- 6<sup>th</sup> edition
4. Theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosb Company
5. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric,- 5<sup>th</sup> edition 2019
6. Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

#### PRACTICAL ( 20 hr)

1. Evaluation of grades of binocular vision, clinical tests and management exercise of accommodation , convergence, suppression, ARC, eccentric fixation and amblyopia
2. Hands on session of basic squint evaluation and Vision therapy exercises.



No.	TOPICS	No of hours
1.**	Introduction to Contact lenses <ul style="list-style-type: none"> <li>• Definition</li> <li>• Classification/Types</li> </ul>	1
2.*	History of Contact Lenses	1
3.**	Optics of Contact Lenses <ul style="list-style-type: none"> <li>• Magnification &amp; Visual field</li> <li>• Accommodation &amp; Convergence</li> <li>• Back &amp; Front Vertex Power/Vertex distance calculation</li> </ul>	3
4.***	CL materials RGP & SCL	4
5.***	Properties of CL materials <ul style="list-style-type: none"> <li>• Physiological(Dk, Ionicity, Water content)</li> <li>• Physical(Elasticity, Tensile strength, Rigidity)</li> <li>• Optical(Transmission, Refractive index)</li> </ul>	3
6.**	Indications and contra indications	2
7.**	Parameters/Designs of Contact Lenses & Terminology	3
8.**	Manufacturing Rigid and Soft Contact Lenses–various methods	2
9.***	Pre-Fitting examination–steps, significance, recording of results	3
10.**	Correction of Astigmatism with RGP lens	2
11.**	Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses	1
12.**	Types of fit–Steep, Flat, Optimum –on Toriccornea with spherical lenses	1
13.**	Calculation and finalising Contact lens parameters	1
14.**	Ordering Rigid Contact Lenses–writing a prescription to the Laboratory	1
15.**	Checking and verifying Contact lenses from Laboratory	1
16.**	Common Handling Instructions (RGP & SCL) <ul style="list-style-type: none"> <li>• Insertion &amp; Removal Techniques</li> <li>• Do's and Don'ts</li> </ul>	1
20.***	<ul style="list-style-type: none"> <li>• Care and Maintenance of Rigid lenses</li> <li>• Cleaning agents &amp; Importance</li> <li>• Rinsing agents &amp; Importance</li> <li>• Disinfecting agents &amp; importance</li> <li>• Lubricating &amp; Enzymatic cleaners</li> </ul>	3
22.**	Complications of RGP lenses	2

	<b>TOTAL HOURS</b>	<b>35</b>
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**Contact lens -1**

**CONTACT LENS II**

No.	TOPICS	No.of hours
1.**	Comparison of RGPvs.SCL	1
2.**	Pre-fitting considerations for SCL	2
3.**	Fitting philosophies for SCL	1
4.**	SCL fitting assessment	2
5.***	Types of fit–Steep, Flat, Optimum	3
6.**	Calculation and finalizing SCL parameters	1
7.**	Disposable lenses a)Advantages and availability	1
8.**	Soft Toric CL <ul style="list-style-type: none"> <li>➤ Stabilization techniques</li> <li>➤ Parameter selection</li> <li>➤ Fitting assessment</li> </ul>	2
9.**	<ul style="list-style-type: none"> <li>➤ Care and Maintenance of Soft lenses</li> <li>➤ Cleaning agents &amp; Importance</li> <li>➤ Rinsing agents &amp; Importance</li> <li>➤ Disinfecting agents &amp; importance</li> <li>➤ Lubricating &amp; Enzymatic cleaners</li> </ul>	2
10.**	Follow up visit examination (RGP & SCL)	1
11.***	Complications of Soft lenses	4
12.**	Therapeutic contact lenses <ul style="list-style-type: none"> <li>➤ Indications</li> <li>➤ Fitting consideration</li> </ul>	1
13.***	Specialty fitting <ul style="list-style-type: none"> <li>➤ Aphakia</li> <li>➤ Pediatric</li> <li>➤ Postrefractive surgery</li> <li>➤ Keratoconus</li> <li>➤ Myopia control</li> </ul>	3
14.**	Introduction to presbyopic CL	1
	<b>TOTAL HOURS</b>	<b>25</b>

**Reference Books**

- IACLE modules A-F

- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 6th edition, Butterworth-Heinemann, 2019
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2019

**Practical hours (20)**

1. Measurement of Ocular dimensions
2. Blink rate and TBUT Schirmer's test
3. Slit lamp examination
4. Keratometry & Placido's disc
5. Lens insertion and removal
6. Lens handling and cleaning
7. Soft Contact Lens fitting & over refraction
8. Examination of old soft Lens & RGP
9. RGP Lens fitting and assessment
10. RGP Lens fluorescein pattern
11. RGP over refraction and Lens flexure
12. RGP Lens parameters
13. Speciality RGP fitting /demo
14. Specialty Soft Contact Lens fitting /demo



SL NO	TOPIC	No. of Lectures
1	**Components of spectacle prescription & interpretation, transposition, Add and near power relation	1
2	***Frame selection – based on spectacle prescription, professional requirements, age group, face shape	4
3	**Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	1
4	***Lens & Frame markings, Pupillary centres, bifocal heights, Progressive markings & adjustments – facial wrap, pantoscopic tilt	2
5	**Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	1
6	**Neutralization – Hand & lensometer, axis marking, prism marking	3
7	***Faults in spectacles (lens fitting, frame fitting, patient's complaints, description, detection and correction)	2
8	**Final checking & dispensing of spectacles to customers, counselling on wearing & maintaining of spectacles, Accessories – Bands, chains, boxes, slevets, cleaners, screwdriver kit	2
9	**Spectacle repairs – tools, methods, soldering, riveting, frame adjustments	2
10	**Special types of spectacle frames <ul style="list-style-type: none"> <li>• Monocles</li> <li>• Ptosis crutches</li> <li>• Industrial safety glasses</li> <li>• Welding glasses</li> </ul>	1

11	*Frame and lens availability in market	1
12	*FAQ's by customers and their ideal answers	1

**PART 1 DISPENSING AND MECHNAICAL OPTICS**

PREREQUISITES: Transposition, lens enhancements, bifocal, progressive, special lenses and frames

SUBJECT : LOW VISION , DISPENSING AND MECHANICAL OPTICS

**Reference Book:**

- David Wilson, Steve stenersen: Practical optical workshop, OTEN- DE, NSW TAFE Commission, 2002
- Margaret Dowaliby: Practical Aspects of Ophthalmic optics, Fourth edition, Butterworth Heinemann, USA, 2001
- System for ophthalmic dispensing By Clifford W.Brooks OD, 4th Butterworth-Heinemann2023



**PRACTICAL HOURS -20 hrs**

1. Troubleshooting, complaints and patient handling
2. Frame adjustments and repairs
3. IPD measurement using pd ruler and pupillometer
4. Myopia management spectacle lenses (DIMS, HALT lenses)
5. Bifocal and progressive markings
6. Types of progressive lenses available in India, brand names, raw material properties, manufacturers, ordering system etc.
7. Criteria of selection of patients for choosing lenses, prisms, aspheric, lenticulars, high index

**SUBJECT : PART 2 LOW VISION**

<b>NO</b>	<b>Topics</b>	<b>TOTAL HOURS</b>
1**	Definitions & classification of Low vision	1
2*	Epidemiology of low vision Model of low vision service	1
3**	Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision	1
4***	Types of low vision aids–optical aids, non-optical aids& electronic devices	3
5***	Optics of low vision aids	1
6***	Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training	3
7**	Pediatric Low Vision care	4
8*	Low vision aids– dispensing& prescribing aspects	1
9**	Visual rehabilitation & counseling	1
10*	Legal aspects of Low vision in India	1
11** *	Case Analysis	5
	<b>TOTAL HOURS</b>	<b>21</b>

**Reference Books:**

- Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
- Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
- A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007
- Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
- E Vaithilingam: practice of Low vision – A guide book, Medical Research Foundation, 2000.

**Practical hours (20)**



1. Attending in low vision care clinic and history taking
2. Low vision patient evaluation techniques
3. Determining the visual impairment, type of telescope and its prescribing magnification
4. Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
5. Determining reading speed with different types of low vision aids with same magnification.
6. Determining reading speed with a low vision aid of different magnifications
7. Trail of low vision aids and device training

**Subject: Public Health, Community Optometry, Occupational Optometry, LAW and Optometry**

**PART 1 : PUBLIC HEALTH & COMMUNITY OPTOMETRY**

No	Topics	No of Lectures
1	**Public Health Optometry: Concept and implementation	1
2	**Dimensions, determinants and indicators of health	1
3	***Levels of disease prevention and levels of health care patterns	1
4	***Epidemiology of blindness – Defining blindness and visual impairment	1
5	**Eye in primary health care	1
6	**Contrasting between Clinical and community health programs	2
7	**Community Eye Care Programs	3
8	**Community based rehabilitation programs	2
9	**Nutritional Blindness with reference to Vitamin A deficiency	1
10	***Vision 2020 & VISION 2030 : The Right to Sight	3
11	**Screening for eye diseases	4
12	**National and International health agencies, NPCB	2
13	**Role of an optometrist in Public Health	1
14	*Organization and Management of Eye Care Programs – Service Delivery models	1
15	**Health manpower and planning & Health Economics	1

16	***Evaluation and assessment of health programmes	1
17	**Optometrists role in school eye health programmes	1
18	***Basics of Tele Optometry and its application in Public Health	2
19	**Information, Education and Communication for Eye Care programs	1
	<b>Total Lectures</b>	<b>30</b>

### Reference books:

- MC Gupta, Mahajan BK, Murthy GVS, 3<sup>rd</sup> edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002
- GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002
- Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980
- K Park: Park's Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007



### **PART 2 OCCUPATIONAL HEALTH OPTOMETRY**

No	सर्वेक्षणं सुखिनः Topics	No of Lectures
1	**Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc Acts and Rules - Factories Act, WCA, ESI Act.	2
2	***Electromagnetic Radiation and its effects on Eye	2
3	**Light – Definitions and units, Sources, advantages and disadvantages, standards	2
4	**Occupational hazards and preventive/protective methods	2
5	**Task Analysis	2
6	**Industrial Vision Screening – Modified clinical method and Industrial Vision test	2
7	***Vision Standards – Railways, Roadways, Airlines	2
8	***Visual Display Units /computer vision syndrome/digital eye strain	2

9	**Contact lens and work	2
10	** Introduction, Importance of Behavioural optometry , types of dyslexia and its identification for optometrist	2
	<b>TOTAL NO. OF LECTURES</b>	<b>20</b>

**Reference books:**

- R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001
- G W Good: Occupational Vision Manual available in the following website: [www.aoa.org](http://www.aoa.org)
- N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, SafchemServices, 1999
- J Anshel: Visual Ergonomics Handbook, CRC Press, 2005
- G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

**LAW AND OPTOMETRY \*\* 10 HRS**

- \*\*Consumer act with respect to optometry and dispensing optical aids
- \*International optometry – Important foreign optometry law
- \*\*Personal and professional Insurance(indemnity)
- \*Employment and contracts
- \*Partnership and alternatives
- \*\*Ethics
- \*\*Negligence
- \*Laws governing practice of medical profession and para-medical profession In India
- \*Registered medical practitioner – laws against practice of medicine of those unregistered – Medical Council of India – Dental Council – Nursing council

\*\*Present rules and regulations – Laws regarding optical product manufacturers –dispensing in India

**SUBJECT : GERIATRIC & PAEDIATRIC OPTOMETRY**

**PART 1 : GERIATRIC OPTOMETRY**

NO.	TOPICS	NO. OF HOURS
1.***	Structural , and morphological changes of eye in elderly	3
2.***	Physiological changes in eye in the course of aging.	3
3.*	Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)	3
4.***	Optometric Examination of the Older Adult	3
5.***	Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye	4
6.*	Contact lenses in elderly	2
7.*	Pharmacological aspects of aging	2
8.***	Low vision causes, management and rehabilitation in geriatrics.	3
9.***	Spectacle dispensing in elderly – Considerations of spectacle lenses and frames	4
10*	Neurological aspects of aging and optometry	2
	TOTAL NO. OF HORS	30

**Reference Books:**

- OP Sharma: Geriatric Care – A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
- VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998
- DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002
- A.J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007

## PART 2 : Paediatric Optometry



**References:**

SL NO	TOPIC	NO OF LECTURES
1	***The Development of Eye and Vision	2
2	**History taking Paediatric subjects	2
3	*Assessment of visual acuity	1
4	*Normal appearance, pathology and structural anomalies of a) Orbit, Eye lids, Lacrimal system,	2
	*b) Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil	2
	**c) Lens, vitreous, Fundus, Oculomotor system	1
5	*Refractive Examination	2
6	*Determining binocular status	1
7	*Determining sensory motor adaptability	1
8	***Compensatory treatment and remedial therapy for: Myopia, Pseudo myopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia	2
9	**Remedial and Compensatory treatment of Strabismus and Nystagmus	2
10	***Paediatric eye disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics	3
11	**Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism	2
12	***Spectacle dispensing for children	3
13	**Paediatric contact lenses	2
14	**Low vision assessment in children	2
15	*Introduction to Neuro optometry & its goals	2
	<b>Total Number of Lectures</b>	<b>30</b>

- Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2<sup>nd</sup> Ed., C.V.Mosby Co. St. Louis, 1980.
- Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
- Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993
- Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
- Paediatric Optometry – William Harvey/ Bernard Gilmartin, Butterworth –Heinemann,2004

**SUBJECT : EPIDEMIOLOGY , RESEARCH METHODOLOGY & BIostatistics**

## Epidemiology 5 HRS

- a. Principles of Epidemiology
- b. Natural History of disease
- c. Methods of Epidemiological studies
- d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defence immunizing agents, cold chain, immunization, disease monitoring and surveillance.

## Research Methodology and Biostatistics 15 HRS

The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Basic Concepts of Biostatistics
6. Types of Data
7. Research tools and Data collection methods
8. Sampling methods
9. Developing a research proposal
10. Scientific writing & Publishing



No	Topics	Number of Lectures
1	Hypertension ➤ Definition, classification, Epidemiology, clinical examination, complications, and management. ➤ Hypertensive retinopathy	4
2	Diabetes Mellitus ➤ Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications ➤ Diabetic Retinopathy	4
3	Thyroid Disease ➤ Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors ➤ Grave's Ophthalmopathy	4

3	<p>Acquired Heart Disease</p> <ul style="list-style-type: none"> <li>➤ Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm</li> <li>➤ Ophthalmic considerations</li> </ul>	4
4	<p>Cancer :</p> <ul style="list-style-type: none"> <li>➤ Incidence</li> <li>➤ Etiology</li> <li>➤ Therapy</li> <li>➤ Ophthalmologic considerations</li> </ul>	4
5	<p>Connective Tissue Disease</p> <ul style="list-style-type: none"> <li>➤ Rheumatic arthritis</li> <li>➤ Systemic lupus erythematosus</li> <li>➤ Scleroderma</li> <li>➤ Polymyositis and dermatomyositis</li> <li>➤ Sjogren syndrome</li> <li>➤ Behcet's syndrome</li> <li>➤ Eye and connective tissue disease</li> </ul>	4
6	<p>Tuberculosis</p> <ul style="list-style-type: none"> <li>➤ Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.</li> </ul>	4
7	<p>Herpes virus (Herepes simplex, Varicella Zoster, Cytomegalovirus, Epstein BarrVirus) Herpes and the eye</p>	3
8	<p>Hepatitis ( Hepatitis A, B, C)</p>	2
9	<p>Acquired Immunodeficiency Syndrome</p>	4
10	<p>Anemia ( Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)</p>	2
9	<p>Common Tropical Medical Ailments</p> <ul style="list-style-type: none"> <li>➤ Malaria</li> <li>➤ Typhoid</li> <li>➤ Dengue</li> <li>➤ Filariases</li> <li>➤ Onchocerciasis</li> <li>➤ Cysticercosis</li> <li>➤ Leprosy</li> </ul>	4



10	<p>Nutritional and Metabolic disorders:</p> <ul style="list-style-type: none"> <li>➤ Obesity</li> <li>➤ Hyperlipidaemias</li> <li>➤ Kwashiorkor</li> <li>➤ Vitamin A Deficiency</li> <li>➤ Vitamin D Deficiency</li> <li>➤ Vitamin E Deficiency</li> <li>➤ Vitamin K Deficiency</li> <li>➤ Vitamin B1,B2, Deficiency</li> <li>➤ Vitamin C Deficiency</li> </ul>	2
11	Myasthenia Gravis	2
12	<ul style="list-style-type: none"> <li>➤ First Aid</li> <li>➤ General Medical Emergencies</li> <li>➤ Preoperative precautions in ocular surgeries</li> </ul>	4
13	<p>Psychiatry</p> <ul style="list-style-type: none"> <li>➤ Basic knowledge of psychiatric condition and</li> <li>➤ Patient Management</li> </ul>	2
14	<p>Genetics</p> <ul style="list-style-type: none"> <li>➤ Introduction to genetics</li> <li>➤ Organisation of the cell</li> <li>➤ Chromosome structure and cell division</li> <li>➤ Gene structure and basic principles of Genetics.</li> <li>➤ Genetic disorders and their diagnosis.</li> <li>➤ Genes and the eye</li> <li>➤ Genetic counseling and genetic engineering.</li> </ul>	4
<b>Total Number of Lectures</b>		<b>57</b>

**Reference Book :**

1. Davidson's Principles and Practice of Medicine  
K.V. Krishnad's - Textbook of Medicine

**Skills based outcomes and monitor able indicators for Optometrist to be assessed during Practical and Viva**

**First year:**

1. Role play
2. Pre Clinical Observations
3. Vision Check

4. Basic Lensometry
5. Basic Life Skills

**Second year:**

1. History taking
2. CEVS practical
3. Refraction Hands On including optical dispensing
4. Clinical Observations
5. Vision screening camps

**Third Year:**

1. Clinical Observation
2. Hands-on under senior optometrists
3. Case reporting
4. Case discussion
5. Vision screening camps
6. Diagnostic interpretations

**Fourth year:**

1. Clinical Observation
2. Hands-on under senior optometrists
3. Case reporting
4. Case discussion
5. Vision screening camps
6. Diagnostic interpretations



**Optometry Rotations & Departments:**

1. Primary Eye Care 25 %
2. Dispensing Optics 25 %
3. Contact Lens 10%
4. Low Vision Aids 10%
5. Orthoptics 10%
6. Diagnostics 10 %
7. Anterior Segment clinic 5%
8. Posterior Segment Clinic 5%
9. School eye screening, Adult screening, Occupational Optometry, etc.

The internship time period provides the students the opportunity to continue to develop confidence, Increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction.

The students are expected to work depending on the need and the healthcare setting. It is mandatory to provide exposure to all the outlined types of clinical postings as below.

## Final Year Optometry

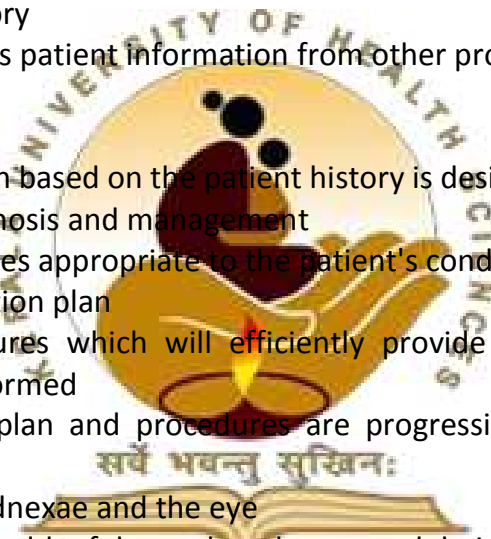
### Skills based outcomes and monitorable indicators for Optometrist

#### 1. PATIENT HISTORY

- a. Communicates with the patient
  - i. Modes and methods of communication are employed which take into account the physical, emotional, intellectual and cultural background of the patient
  - ii. A structured, efficient, rational and comfortable exchange of information between the optometrist and the patient takes place
- b. Makes general observations of patient
- c. Obtains the case history
- d. Obtains and interprets patient information from other professionals

#### 2. PATIENT EXAMINATION

- a. Formulates
  - i. An examination plan based on the patient history is designed to obtain the information necessary for diagnosis and management
  - ii. Tests and procedures appropriate to the patient's condition and abilities are selected.
- b. Implements examination plan
  - i. Tests and procedures which will efficiently provide the information required for diagnosis are performed
  - ii. The examination plan and procedures are progressively modified on the basis of findings
- c. Assesses the ocular adnexae and the eye
  - i. The structure and health of the ocular adnexae and their ability to function are assessed
  - ii. The structure and health of the anterior segment and its ability to function are assessed
  - iii. The structure and health of the ocular media and their ability to function are assessed
  - iv. The structure and health of the posterior segment and its ability to function are assessed.
  - v. The nature of the disease state is determined
  - vi. Microbiological tests are selected and ordered
- d. Assesses central and peripheral sensory visual function and the integrity of the visual pathways
  - i. Vision and visual acuity are measured
  - ii. Visual fields are measured
  - iii. Colour vision is assessed
  - iv. Pupil function is assessed
- e. Assesses refractive status
- f. Assesses oculomotor and binocular function
  - i. Eye alignment and the state of fixation are assessed



- ii. The quality and range of the patient's eye movements are determined
- iii. The status of sensory fusion is determined
- iv. The adaptability of the vergence system is determined
- v. Placement and adaptability of accommodation are assessed
- g. Assesses visual information processing
  - i. Visual perceptual abilities are assessed
  - ii. Visual-motor integration is assessed
- h. Assesses the significance of signs and symptoms found incidental to the ocular examination in relation to the patient's eye and/or general health
- i. Pertinent non-ocular signs and symptoms found incidentally during the ocular examination are identified and considered
- j. Ensures that significant non-ocular signs and symptoms are investigated

### **3. DIAGNOSIS**

- a. Interprets and analyses findings to establish a diagnosis or diagnoses
- b. Accuracy and validity of test results and information from the case history and other sources are critically appraised
- c. Test results and other information are analysed, interpreted and integrated to establish the diagnosis or diagnoses

### **4. PATIENT MANAGEMENT**

- a. Designs a management plan for each patient and implements the plan agreed to with the patient
- b. The diagnosis is presented and explained to the patient
- c. Consideration is given to the relative importance or urgency of the presenting problems and examination findings
- d. Management options to address the patient's needs are explained
- e. A course of management is chosen with the patient, following counselling and explanation of the likely course of the condition, case management and prognosis
- f. The informed consent of the patient is obtained for the initiation and continuation of treatment
- g. Patients requiring ongoing care and review are recalled as their clinical condition indicates, and management is modified as indicated

### **5. PRESCRIBES SPECTACLES**

- a. The suitability of spectacles as a form of correction for the patient is assessed
- b. The patient's refraction, visual requirements and other findings are applied to determine the spectacle prescription

### **6. PRESCRIBES CONTACT LENSES**

- a. The suitability of contact lenses as a form of correction for the patient is assessed
- b. The patient's refraction, visual requirements and other findings are applied to determine the contact lens prescription
- c. Therapeutic and cosmetic contact lenses are recommended and prescribed
- d. Contact lenses are correctly ordered and on receipt, parameters are verified before the lenses are supplied to the patient
- e. Contact lenses are checked on the eye for physical fitting and visual performance

- f. The patient is instructed in matters relating to ocular health and vision in contact lens wear, contact lens care and maintenance
- g. Contact lens performance, ocular health and patient adherence to wearing and maintenance regimen is monitored

**7. PRESCRIBES LOW VISION DEVICES**

- a. A range of low vision devices is demonstrated
- b. Low vision devices suited to the patient's visual requirements and functional needs are prescribed
- c. The patient is instructed in the use of the low vision device
- d. The success of the low vision device is evaluated and monitored and additional or alternative devices are prescribed
- e. The patient is informed of and, if necessary, referred to other rehabilitative services

**8. PRESCRIBES PHARMACOLOGICAL TREATMENT REGIMENS**

- a. Selects appropriate pharmacological agents for the treatment of the patient's condition
- b. Microbiological factors are considered in the choice of therapeutic agent(s)
- c. Pharmacological factors are considered in the choice of therapeutic agent(s)
- d. Systemic factors are considered in the choice of therapeutic agent(s)
- e. Ocular factors are considered in the choice of therapeutic agent(s)
- f. Available delivery systems are considered in the choice of therapeutic agent(s)
- g. Drug substitution factors are considered in the choice of therapeutic agent(s)
- h. Prescribes therapeutic drugs
- i. Monitors and modifies treatment regimen
- j. Instructs/counsels patient on the correct use of the prescribed drugs
- k. Patients are instructed about precautionary procedures and non-therapeutic management

**9. DISPENSES OPTICAL PRESCRIPTIONS ACCURATELY**

- a. The prescription is interpreted and responsibility for dispensing is accepted
- b. The patient is assisted in selecting an appliance
- c. Lenses are ordered and fitted to spectacle frames in accordance with accepted standards
- d. The appliance is verified against the prescription prior to delivery
- e. The appliance is adjusted and delivered and the patient is instructed in the proper use and maintenance of the appliance and of any adaptation effects which may be expected

**10. MANAGES PATIENTS REQUIRING VISION THERAPY**

- a. Treats patients diagnosed with accommodative, vergence, strabismic and amblyopic conditions
- b. The patient is instructed in the use and maintenance of vision training equipment
- c. Goals of the vision therapy program and criteria for discharge are set
- d. Progress of the vision therapy program is monitored

**11. TREATS OCULAR DISEASE AND INJURY**

- a. Non-pharmacological treatment or intervention procedures are performed
- b. Pharmacological and/or other regimens are instituted and therapeutic devices are introduced to treat eye conditions

- c. The patient is instructed in the use, administration, storage and disposal of pharmaceutical agents
- d. The effect of treatment is monitored and changes in management are recommended

**12. REFERS THE PATIENT**

- a. The need for referral to other professionals for assessment and/or treatment is recognized and discussed with the patient.
- b. A suitable professional is recommended to the patient
- c. Timely referral, with supporting documentation, is made to other professionals
- d. Patients can be jointly managed with other health care practitioners

**13. CO-WORK WITH OPHTHALMOLOGIST IN THE PROVISION OF PRE AND POST OPERATIVE MANAGEMENT OF PATIENTS**

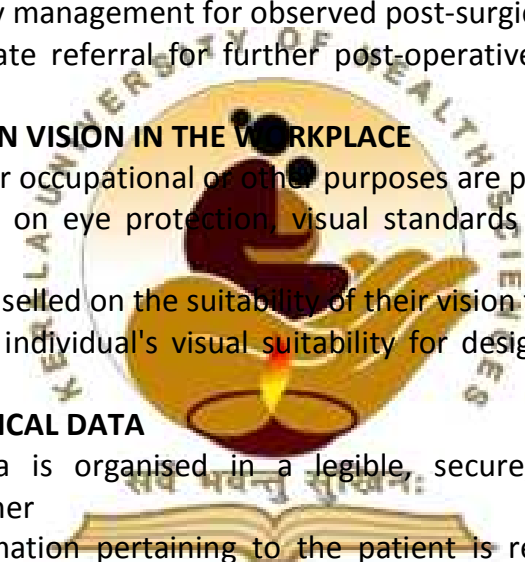
- a. Provides pre-operative assessment and advice
- b. Provides post-surgical follow-up assessment and monitoring of signs according to the surgeon's requirements and the procedure undertaken
- c. Provides emergency management for observed post-surgical complication
- d. Arranges appropriate referral for further post-operative treatment or assessment of complications

**14. PROVIDES ADVICE ON VISION IN THE WORKPLACE**

- a. Visual screenings for occupational or other purposes are provided
- b. Advice is provided on eye protection, visual standards and visual ergonomics in the workplace
- c. Individuals are counselled on the suitability of their vision for certain occupations
- d. Certification of an individual's visual suitability for designated occupations or tasks is provided

**15. RECORDING OF CLINICAL DATA**

- a. Ensures that data is organised in a legible, secure, accessible, permanent and unambiguous manner
- b. All relevant information pertaining to the patient is recorded in a format which is understandable and useable by the optometrist and his/her colleagues
- c. Patient records are kept in a readily retrievable format and are physically secure
- d. Maintains confidentiality of patient records
- e. Understands the need to ensure that access to records is limited to authorised personnel
- f. Information from patient records and/or obtained from patients is released only with the consent of the patient



**Competency Standards for Entry Level into the Profession of Optometry in India  
Indian Entry Level Optometry Competency Skill Standard (IELOCS)**

These standards have been developed for the profession, as it exists in 2011 and are expected to be altered as technology and knowledge expand, optometrists' clinical skills and community expectations broaden and professional aspirations are fulfilled

**What is a competency?**

‘Competency is the Ability to perform the activities within an occupation or function to the standard expected in employment’.

OR

Competency has been defined as the Ability to perform the responsibilities required of professionals to the standards necessary for safe and effective practice.

A competency will be a combination of the specification and application of a knowledge or skill within the occupation, to the appropriate standard. It will include the requirement to perform individual tasks; to manage a number of different tasks, to respond to irregularities and breakdowns in routine and to deal with the responsibilities and expectations of the work environment. Thus, it will be a combination of task skills, task management skills, contingency management skills and job/role environment skills.

Competency-based standards are seen to encompass all forms of achievement of competence rather than only formal indicators such as formal qualifications from educational institutions and could have a role in the process of articulation or linkage between professions and related trades or occupations.

What is the goal of developing Entry Level Optometry Competency Skill document?

The goal of the IELOCS is to enable the schools of optometry in India to design their curriculum based on this document so that the optometric students passing out from their institute achieve the expected competency skills in/for the profession of optometry.

### **Terminology:**

Some terms used in this document have specific meanings within the context of competency standards

**Unit:** A major segment of the overall competency of the profession, typically representing a major function or role of the profession.

**Performance criteria:** Evaluative statements which specify the required level of performance.

**Indicators:** Measurable and observable features, which can assist in determining whether a competency is achieved.

### **Classification Units of Competency Skills at Entry level for Optometrists**

- A) Communication Skills
- B) Professional Conduct
- C) Patient Examination and Management
- D) Optical Dispensing
- E) Documentation

### **Communication Skills**

Ability to communicate effectively with the patient, taking into accounts his/ her physical, emotional, intellectual, social and cultural background.

Ability to build rapport and empathy with patients from all backgrounds

Ability to take a structured, efficient, accurate history from patients with or without any ophthalmic and / or systemic problems and needs.

Ability to impart information in a manner which is appropriate to the recipient Ability to be flexible in routine so as to make assimilation of information easy especially with illiterates, people with special needs

### **Professional Conduct**

Ability to protect patient data and records for confidentiality.

Ability to manage patients in a safe, appropriate and confidential environment.

Ability to comply with legal, professional, and ethical issues relating to practice.

### **Patient Examination and management**

Ability to measure vision and visual acuity

Ability to detect and measure the spherical, astigmatic and presbyopic corrections

Ability to prescribe refractive correction for different age groups and Visual needs.

Ability to examine and identify abnormalities of the external eye and adnexa using appropriate instruments and techniques

Ability to differentiate and grade normal and abnormal findings

Ability to examine and identify abnormalities of the cornea using appropriate instruments and techniques

Ability to use contact and non-contact tonometers to measure intraocular pressure and analyse and interpret the results

Ability to examine and identify abnormalities in the anterior chamber

Ability to examine and identify abnormalities in the iris and assess pupil Reflexes

Ability to examine and identify abnormalities in the crystalline lens using appropriate instruments and techniques

Ability to examine and identify abnormalities in the vitreous and fundi using Appropriate instruments and techniques

Ability to diagnose and manage the case within the purview of the optometry care.

Ability to select appropriate, and use safely, the range of ophthalmic drugs and diagnostic stains available to an optometrist

Ability to formulate the follow up routines

Ability to refer where appropriate for further management

Ability to interpret all investigation reports.

### **Contact Lenses**

Ability to take relevant history including previous contact lens wear

Ability to prescribe Contact lenses appropriate for different age groups and Visual needs

Ability to assess anterior eye health as a part of pre-fitting evaluation

Ability to quantify corneal shape and size, and pupil

Ability to select the optimum lens

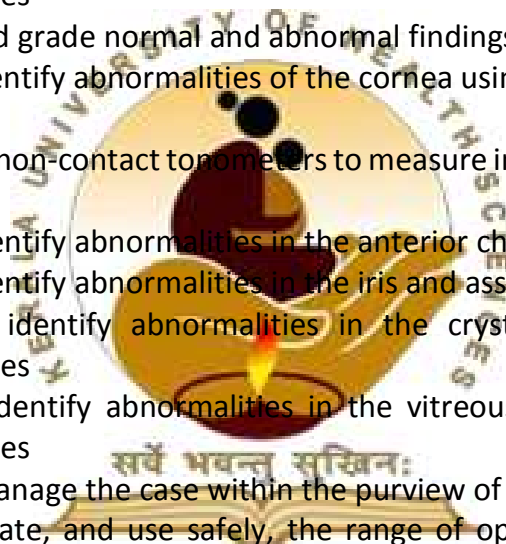
Ability to assess and optimize lens fit

Ability to teach a patient to safely insert, remove and care for contact lenses

Ability to monitor the anterior eye health of contact lens wearers and refer Where appropriate

### **Binocular Vision**

Ability to assess eye alignment and eye movements





Ability to assess sensory fusion and stereopsis.  
 Ability to assess oculomotor function.  
 Ability to assess convergence and accommodation  
 Ability to prescribe orthoptic exercises appropriate for different age groups and visual needs.  
 Ability to refer where appropriate for further management  
 Ability to formulate the follow up routines

**Visual Impairment (Low Vision)**

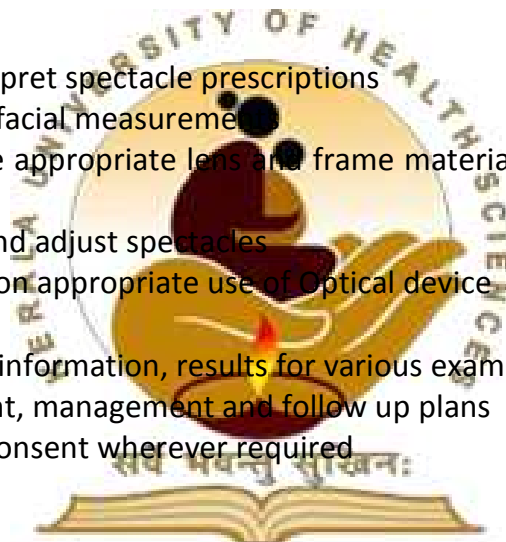
Ability to take an appropriate history of a visually impaired patient  
 Ability to accurately quantify visual impairment and relate it to the underlying pathology and functional consequences  
 Ability to advise on the use of optical and non-optical aids  
 Ability to prescribe Low Vision devices appropriate for different age groups and visual needs.  
 Ability to refer where appropriate for further management  
 Ability to formulate the follow up routines.

**Optical**

Dispensing Ability to interpret spectacle prescriptions  
 Ability to take frame and facial measurements  
 Ability to recommend the appropriate lens and frame material and design based on wearers needs and prescription  
 Ability to verify, modify and adjust spectacles  
 Ability to advise patients on appropriate use of Optical device

**Documentation**

Ability to record relevant information, results for various examination procedures.  
 Ability to record treatment, management and follow up plans  
 Ability to obtain patient consent wherever required



**PROJECT WORKS**

**Prerequisite: Basics of Research methodology, data handling and biostatistics**

This course aims to enable the learner to appreciate the theoretical concepts learnt on the basics of Research and apply it to initiate a research and propose an action plan. It would also prepare the learner to seek permissions from the relevant research bodies.

During the course the learner is expected to decide on a research topic after discussion with the respective guides, perform a thorough literature review, attend periodic journal clubs, interact with peers, faculty and guide, prepare a review of literature through presentation, formulate the methodology after discussion with the guide and plan and present for approval from the Institutional Review Board and ethics Committee.

Critically review, propose, plan, implement and judge an appropriate research idea into reality, discuss on the results and conclude decisions based on the work.

The learner will complete data collection, analyze the data and conclude, understand the scope and limitations of the work present a complete report.

Learner will also have periodic discussions with the guide and incorporate the discussion agenda into the research work

**OBJECTIVE:**

Upon completion of individual the learner will be able to:

1. Critically review and summarize literature
2. Propose a work plan
3. Arrange for obtaining approvals from the IRB and Ethics committee
4. To use appropriate strategy to clean and code the collected data
5. To use suitable statistical methods to present results
6. To complete research from the initial steps of problem identification to the final outcome
7. To submit a dissertation on their relevant interest area
8. To defend the work to vision scientists, clinicians and public
9. To submit a manuscript in indexed journal

HOD shall distribute the hours of lecture /practical /tutoring and other works.

HOD shall designate the number of guides and co guides for every project under a common KUHS format.

Subject teachers shall be responsible for the skill based training according to the Indian competency standards.

This may involve tutoring hours in addition to lecture and practical hours conducted

HOD shall chair various group discussions, seminars, case presentations etc. undertaken monthly or weekly for all years

Academic calendar with internal exam calendar shall be obtained from university

Monthly review meetings of academic and non academic student activity shall be recorded

Faculties & coordinators shall equally be allotted in committees such as Anti ragging , SSGP , KUHS sports ,arts, festival and other scientific /eye care celebration

Faculties may be allotted fixed hours/month /year for institutional research or clinical orientations / up gradation from time to time.

HOD shall emphasize the team to attend/present minimum 1 number of national /international conferences online/offline every year

Every faculty shall be given opportunity /leave to present his work during that time

In absence or leave of any faculty it is the responsibility of the HOD & other faculties to designate/distribute the working hours without affecting the curriculum status of the students before the end of that semester.

Remedial classes for non performers and low achievers must be allotted upon discussion with PTA and Principal if required under the banner of SSGP.

**2.10 Practical training**

As per [“Teaching learning methods “ and “Content of each subject in each year “] above.

**2.11 Records :**

To be maintained for all Practical Work

**2.12 Dissertation:**

**2.13 Speciality training if any**

As per [“Teaching learning methods “ and “Content of each subject in each year “]above.

**2.14 Project work to be done if any**

As stipulated by the HoD if necessary.

**2.15 Any other requirements [CME, Paper Publishing etc :**

An candidate must participate in atleast 2 workshop /CME or scientific seminars conducted by national / state forums in 2<sup>nd</sup> and 3<sup>rd</sup> yr out of which 1 can be offline.

A candidate shall submit a proof of submission to any 1scientific journal the final yr project before completion of internship.Training.

**2.16 Reference books**

As per [“Teaching learning methods “ and “Content of each subject in each year “] above.

**2.17Journals:**

As decided by the HoD.

**2.18.Logbook :**

To be maintained for all academic work and shall be countersigned by the concerned HOD.



**3. EXAMINATIONS**

**3.1 Eligibility to appear for exams [including Supplementary]**

Each candidate should put in minimum 80% of attendance in theory and clinical practical separately for appearing university examination. There shall be three Sessional examinations, the final one in the University model and is mandatory to appear. The average of the highest two marks shall be taken as the internal assessment mark.

The candidate must secure a minimum of 50% marks for internal assessment in a particular subject in theory and practical separately, in order to be eligible to appear in the university examination of the subject.

**Attendance and condonation**

Each candidate should put in minimum 80% of attendance in theory and practical separately for each subject to appear in university examination. Condonation of 10% in the attendance once in the entire course period can be granted by the Head of the Institution in consultation

with HOD and the same may be communicated to the university along with prescribed fee, and a declaration that the student has not availed the facility in the previous years. There shall be a register for recording the details of condonation granted to students which is subject to periodic verification by KUHS.

### 3.2 Schedule of Regular/Supplementary exams

There will be two examinations one regular and one supplementary in an academic year. The supplementary examinations shall be conducted within 6 months after declaration of results.

A student fails either in theory or practical shall appear for both theory and practical again.

### 3.3 Scheme of examination showing maximum marks and minimum marks

REFER ANNEX

### 3.4 Papers in each year:

As given under "Teaching learning methods " and "Content of each subject in each year " above

### 3.5 Details of theory exams [include number of papers, Duration, Type of questions & number of questions and marks

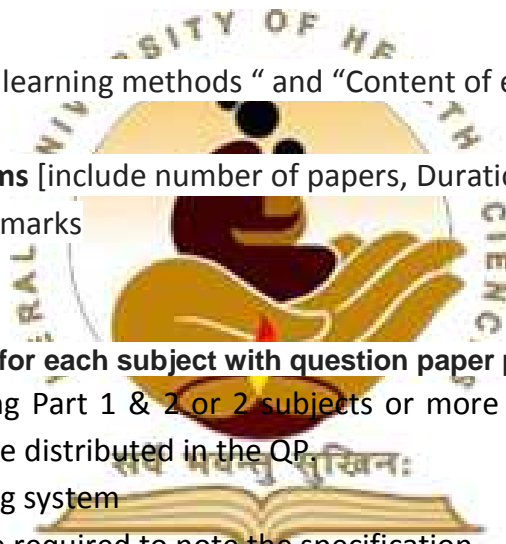
As per clause 3.3

### 3.6 Model question paper for each subject with question paper pattern

All exams /subjects having Part 1 & 2 or 2 subjects or more combined shall be 40 to 50 % weightage from either side distributed in the QP.

Syllabus has a star marking system

Faculties and students are required to note the specification.



QP Code:

Reg. No.:.....

THIRD BSc OPTOMETRY FINAL AVERAGE EXAMINATION (Model Question Paper)

### Community optometry

Time: 2 hrs

Maximum marks: 40

Answer all questions Draw diagrams wherever necessary

### Essays

1. Explain the concepts of an occupational health hygiene and safety ? What is the role of an optometrist in vision related services ?

( 2+2+3+3=10)

### Short notes (3x5=15)

2. Personal and professional insurance
3. School eye screening programme
4. Consumer protection act

**Answer briefly (5x2=10)**

5. Teleoptometry
6. Human resource utilization rate
7. 4 causes of preventable blindness in a child
8. Define health Economics
9. 4 methods of prevention of occupational diseases

**One word answer (5x1=5)**

10. Most common type of congenital cataract is -----.
11. -----is an example of chemical hazard .
12. Behavioural Optometrist is a professional who -----.
13. NPCB .....expand .
14. What is vision 2020?

QP Code: Reg. No.:.....

**THIRD BSc OPTOMETRY FINAL AVERAGE EXAMINATION (Model Question Paper)**

**Squint and BSV**

Time: 2 hrs

Maximum marks: 40

Answer all questions

Draw diagrams wherever necessary

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Essays

1. Write an essay on Classification and investigation & Management of an Accommodative esotropia

( 2+5+3=10)

Short notes (3x5=15)

2. Features of Restrictive squints
3. Abnormal retinal correspondence
4. TNO test

Answer briefly

(5x2=10)

5. Angle kappa
6. Forced duction test
7. Mobius syndrome
8. Uncrossed diplopia
9. Optokinetic nystagmus

One word answer (5x1=5)

10. Crossed diplopia is seen in -----.
11. Normal AC/A ratio is -----.
12. The muscle affected in Brown's syndrome is -----.
13. Crowding phenomenon is a feature of -----.
14. Secondary deviation is more than primary deviation in -----.

QP Code:

Reg No.: .....

**Third Year B.Sc Optometry final Examination (Model Question Paper)**

**Paediatric and Geriatric Optometry**

Time: 2 hrs

Max marks: 40

- Answer all questions
- Draw diagram wherever necessary

**Essay (10)**

1. Briefly explain spectacle dispensing in elderly

**Short notes (3x5=15)**

2. Low vision assessment in children
3. Retinoblastoma
4. Physiological changes in eye in the course of aging

**Answer briefly (5x2=10)**

5. What all are the factors to be considered while performing an optometric examination of older adults ?
6. Mention the charts for paediatric visual acuity assessment
7. Albinism
8. Compensatory treatment of Amblyopia
9. Write a note on contact lens options for older adults

**One word answer (5x1= 5)**

10. Crystalline lens derives from -----
11. An annular lipid infiltration of corneal periphery is called.....
- 12..... lenses are recommended for children
13. Choroidal neovascularization can be detected using.....
14. ----- syndrome causes superior temporal dislocation of lens.



**3.7 Internal assessment component**

Minimum three internal examinations shall be conducted in each subject during a year of which the final one is University model examination and is mandatory. The average marks of two best

performances shall be taken into consideration for the award of internal marks. Marks of evaluation by other methods like assignments, seminars, projects etc. can be added to the internal marks. A candidate must obtain 50% of marks in internal assessment to be eligible to appear the university examination. The class average of internal assessment marks the whole class should not exceed 75% of maximum marks for regular examination and 80% for supplementary examination.

The candidates who have failed to obtain the minimum internal marks should be given another chance to improve their internal assessment mark only before the next scheduled university examination.

The award shall be on the basis of the assessment made by the teachers from the candidate's performance in the assignments, class tests, Optical shop work, record work etc.

### **3.8 Details of practical examination**

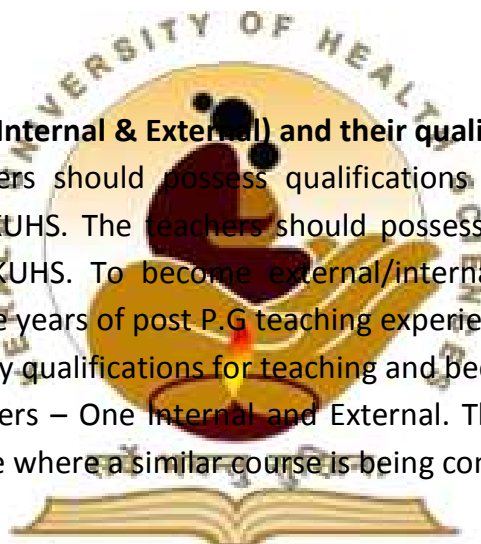
ANNEXURE

### **3.9 Number of examiners (Internal & External) and their qualifications**

The teachers and examiners should possess qualifications acquired from a University / Institution recognized by KUHS. The teachers should possess post graduate degree from a university recognized by KUHS. To become external/internal examiner a teacher should possess a minimum of three years of post P.G teaching experience in the concerned subject.

The following are the faculty qualifications for teaching and becoming and Examiner.

There shall be two examiners – One Internal and External. The External examiners shall be drawn from another college where a similar course is being conducted.



### **3.10 Details of viva:**

As per "Papers in each year "above

## **4. INTERNSHIP**

### **4.1 Eligibility for internship**

Students will be eligible to do internship only after passing all the theory papers and Clinical practicum.

Provisional registration-After passing the final year exam before joining for internship all students have to take provisional registration from Kerala state Para medical council .

### **4.2 Details of internship Training**

Duration: Every candidate admitted BSc optometry degree course shall undergo one year of compulsory rotating internship after passing of the final year examinations.

The joining of internship training shall be within 10 working days of result publication of 3<sup>rd</sup> yr BSc Optometry. No candidate shall be awarded degree certificate without successfully completing one year of internship.

Internship posting: As directed by the HOD under following departments

**Optometry Rotations & Departments:**

1. Primary Eye Care 25 %
2. Dispensing Optics 25 %
3. Contact Lens 10%
4. Low Vision Aids 10%
5. Orthoptics 10%
6. Diagnostics 10 %
7. Anterior Segment clinic 5%
8. Posterior Segment Clinic 5%
9. School eye screening, Adult screening, Occupational Optometry, etc

**Maintenance of records by students:**

Submission of internal works such as journal presentation, case presentation, seminars as per the institutional guidelines is mandatory.

Successful completion- the student must maintain a log book.

On completion of each posting the same will have to be certified by the faculty in-charge of the posting for both attendance as well as work done. On completion of all postings, the duly completed log book will be submitted to the Principal / Head of the Institution/programme to be considered as having successfully completed the internship programme.

Extension of internship: Internship shall be extended by the number of days the students remains absent. These extended days of Internship should be completed in the respective external/internal Institution. Any other leave other than eligible leave has to be compensated by extension granted by Principal.

Continuous leave of more than 2 weeks shall not be permitted failing which the candidate shall be required to apply for condonation too the university.

**4.3 Model of Internship Mark lists**

Internship completion certificate: Issued from the concerned Institution, UNIVERSITY VIVA PRACTICAL FINAL YEAR AND PROJECT PRESENTATION.

**4.4 Extension rules:**

Any other leave other than eligible leave less than 6 months has to be compensated by extension granted by the Principal.



Extension of internship: Internship shall be extended by the number of days the students remains absent. These extended days of Internship should be completed in the respective external/internal Institution. Any other leave other than eligible leave has to be compensated by extension granted by Principal. However, the course shall be completed within double the duration of the course.

#### 4.5 Details of Training given

Every candidate admitted BSc optometry degree course shall undergo one year of compulsory rotating internship after passing of the final year examinations. No candidate shall be awarded degree certificate without successfully completing one year of internship.

### 5. ANNEXURES

5.1 Check Lists for Monitoring: Log Book, Seminar Assessment etc. to be formulated by the curriculum committee of the concerned Institution

YEAR	Case submissions with common format
2ND YR	20 (include clinical instrumentation of anterior/posterior segments )
2ND YR	20 (include spherical/astigmatic /presbyopic cases )
2ND YR	20 (include use of optical instruments /devices/measuremnts )
3RD YR	10 cases anterior and 10 posterior segment diseases
3RD YR	10 cases including soft , rgp and speciality fittings
3rd YR	10 low vision and 10 optical dispensing
3rd YR	10 cases of squint / orthoptics
FINAL YR	1 project book submission in kubs format as per ug standards .
FINAL YR	20 cases /trouble shooting/dispensing (include speciality lenses and frames )
FINAL YR	50 case recordings (include eye diseases of anterior and posterior segments )
FINAL YR	50 case recordings : contact lens RGP,SOFT ,SPECIALITY , squint & orthoptics

Sr no	Subject	THEORY		PRACTICAL/ viva		THEORY		PRACTICAL/ viva		TOTAL		TUTORIAL HOURS	MINIMUM NUMBER OF LECTURE HOURS	MINIMUM NUMBER OF PRACTICAL HOURS	TOTAL HOURS
		max	min	max	min	max	min	max	min						
1	General Anatomy	20	10	NIL	NIL	40	20	nil	nil	60	30	40	40	20	
2	Ocular Aantomy	20	10	NIL	NIL	40	20	nil	nil	60	30	40	40	20	
3	General Phsiology	20	10	NIL	NIL	40	20	nil	nil	60	30	40	40	20	
4	Ocular Physiology	20	10	NIL	NIL	40	20	nil	nil	60	30	40	40	20	
5	Physical Optics & Geometrical Optics	20	10	NIL	NIL	80	40	nil	nil	60	30	40	80	20	
6	Bio Chemistry & Nutrition	20	10	NIL	NIL	40	20	nil	nil	60	30	40	40	20	

7	internal	Foundation course in pre clinical optometry & Allied health profession	100	50	NIL	NIL	nil	nil	nil	nil	100	50	200	100	60	
<b>TOTAL</b>			<b>220</b>	<b>110</b>	<b>0</b>	<b>0</b>	<b>280</b>	<b>140</b>	<b>NIL</b>	<b>NIL</b>	<b>460</b>	<b>230</b>	<b>440</b>	<b>380</b>	<b>180</b>	<b>1000</b>

Sr no	Subject	IA				UE				TOTAL		TUTORIAL HOURS	LECTURE HOURS	PRACTICAL HOURS	TOTAL HOURS	
		THEORY	PRACTICAL/viva		THEORY	PRACTICAL/viva		max	min							
1	General & Ocular Pharmacology	20	10	nil	nil	40	20	nil	nil	60	30	40	40	20		
2	General & Ocular Pathology	20	10	nil	nil	40	20	nil	nil	60	30	40	40	20		
3	Microbiology, Sterilization & Theatre techniques	20	10	nil	nil	40	20	nil	nil	60	30	40	40	20		
4	Clinical examination of the visual system & Eye Instrumentation	20	10	20	10	40	20	40	20	120	60	40	40	20		
5	Visual optics	20	10	20	10	40	20	40	20	120	60	40	40	20		
6	Optometric optics	20	10	20	10	40	20	40	20	120	60	40	40	20		
7	internal	CLINICS 1 & 2 : Clinical + optical postings, record works, log book 1, seminars, CME activities, attendance			10	5				10	5			500		
<b>TOTAL</b>			<b>120</b>	<b>60</b>	<b>65</b>	<b>35</b>	<b>240</b>	<b>120</b>	<b>NIL</b>	<b>NIL</b>	<b>550</b>	<b>275</b>	<b>240</b>	<b>240</b>	<b>620</b>	<b>1100</b>



Sr no	Subject	IA				UE				TOTAL		TUTORIAL HOURS	LECTURE HOURS	PRACTICAL HOURS	TOTAL HOURS
		THEORY	PRACTICAL/viva		THEORY	PRACTICAL/viva		max	min						
1	Eye Disease 1 & 2	20	10	20	10	40	20	40	20	120	60	20	40	20	
2	Contact Lens 1 & 2	20	10	20	10	40	20	40	20	120	60	20	40	20	
3	Low Vision Aids, Mechanical and dispensing optics	20	10	20	10	40	20	40	20	120	60	20	40	20	

4		Binocular Vision , Squint & Orthoptics	20	10	20	10	40	20	40	20	120	60	20	40	20	
5		Community optometry ,occupational optometry , law and optometry ,public health optometry	20	10	20	10	40	20	nil	nil	80	40	20	40	20	
6		Geriatric and Paediatric optometry	20	10	20	10	40	20	nil	nil	80	40	10	40	20	
7	internal	Systemic diseases	20	10	nil	nil	nil	nil	nil	nil	20	10	10	40		
8	internal	Epidemiology , Research Methodology & Biostatistics	20	10	nil	nil	nil	nil	nil	nil	20	10	10	20	20	
9	internal	CLINICS 3 & 4 : Clinical + community postings, record works , log book 2 , seminars , CME activities ,attendance				10	5	nil	nil	nil	10	5		nil	500	
		<b>TOTAL</b>	<b>160</b>	<b>80</b>	<b>130</b>	<b>65</b>	<b>240</b>	<b>130</b>	<b>160</b>	<b>80</b>	<b>690</b>	<b>345</b>	<b>130</b>	<b>300</b>	<b>640</b>	<b>1070</b>

sr no	FOURTH YEAR BSC OPTOMETRY	IA				UE				TOTAL	
		THEORY		PRACTICA L/viva		THEORY		PRACTIC AL/viva			
1	PROJECT WORKS	nil	nil	10	nil	nil	nil	40	nil	50	nil
	Optical Postings	nil	nil	10	nil	nil	nil	nil	nil	10	nil
	CLINICS 5 & 6 : Clinical + community postings, record works , log book 3 , seminars , CME activities	nil	nil	20	nil	nil	nil	nil	nil	20	nil
2	Skill Competancy exam							10 0	50	10 0	50
	<b>TOTAL</b>	NIL	NIL	<b>40</b>		NIL	NIL	<b>14 0</b>	<b>NIL</b>	<b>18 0</b>	<b>10 0</b>

TRAINING HOURS	TOTAL HOURS
200	
400	
1400	
2000	2000