

ANN I-A (CCII) 2009-10 BACHELOR OF SCIENCE (OPTOMETRY)

REGULATIONS AND SYLLABUS  
FOR  
BACHELOR OF SCIENCE (OPTOMETRY)

*Offered by*

BHARATHIAR UNIVERSITY, COIMBATORE  
FROM 2009 – 2010

*Under the*

CENTRE FOR COLLABORATION OF  
INDUSTRY AND INSTITUTIONS (CCII)  
COLLABORATIVE PROGRAMME

**Bharathiar University, Coimbatore – 641046.**  
**Centre for Collaboration of Industry and Institutions (CCII)**

**BACHELOR OF SCIENCE (OPTOMETRY)**

**REGULATIONS AND SYLLABUS**

**REGULATIONS**

**1. Course description / Objective of the course**

To help the optometrician in his / her patient's care. Optometry will work under optometrician's guidance. The objective of the course is to train the candidate in patient care related activities without independent powers in patient's final treatment or its decision making.

**2. Eligibility of the course**

- a) Candidate for admission for this course shall be required to have successfully completed + 2 examinations.
- b) Candidates with Degrees are also eligible.
- c) Physical fitness certificate to be obtained from a Registered Medical Practitioner.

**3. Duration of the course**

This course will extend over a period of 3 years.

Candidate admitted to this course will work during his/her training in hospitals, in outpatient, inpatient and hospital's all other departments. He / She has to attend theory classes as specified.

Examinations shall be conducted at the end of each year for the respective subjects (Calendar year extends from January to December or July to June including admission and examination period for each year, excluding Sundays and festival holidays declared by Govt. of Tamil Nadu).

**4. Course of Study and Scheme of Examination**

Course of study for the B. Sc Optometry shall consist of the following:-

Part I: Language (including Indian and Foreign language)

Part II: English (Communicative English)

Part III: Core Papers related to subject of study

Part I and Part II shall be taught only during the first year

Part III will be taught during all the three years.

**FIRST YEAR**

Paper No	Subject	Credits	Marks	
			Int.	Ext.
1	Language I	4	40	60
2	Language II	4	40	60
3	Physical Optics	4	40	60
4	Geometric Optics	4	40	60
5	General Anatomy & Ocular Anatomy	4	40	60
6	General Physiology & Ocular Physiology	4	40	60
7	General Bio\Chemistry & Ocular Bio\Chemistry	4	40	60
8	Physiology & Nutrition	4	40	60
9	Practical Physical Optics (Practical & Viva)	6	60	90
10	Practical - Geometric Optics (Practical & Viva)	6	60	90
11	Computer programming (Practical)	6	60	90

\* As prescribed for the Bachelor of Arts and Science Programme of Bharathiar University. However instead of two semester exams there will be only one exam at the end of the I year

**SECOND YEAR**

Paper No.	Subject	Credits	Marks	
			Int.	Ext.
1	Optometric Optics	4	40	60
2	Visual Optics	4	40	60
3	Optometric Instruments & Clinical examinations of Visual system	4	40	60
4	General Pharmacology & Ocular Pharmacology	4	40	60
5	Microbiology & Pathology	4	40	60
6	Statistics & Occupational Optometry	4	40	60
7	Practical - Optometric Optics (Practical & Viva)	6	60	90
8	Practical - Visual Optics (Practical & Viva)	6	60	90
9	Clinical Work – Theory and Clinical	6	60	90

## THIRD YEAR

Paper No	Subject	Credits	Marks	
			Int.	Ext.
1	Squint & Binocular Vision	4	40	60
2	Contact Lens	4	40	60
3	Ocular diseases	4	40	60
4	Low vision aids	4	40	60
5	Geriatric Optometry & Pediatric Optometry	4	40	60
6	Project	6	60	90
7	Practical – Squint (Practical & Viva)	6	60	90
8	Practical -Contact lens (Practical & Viva)	6	60	90
9	Practical - Ocular diseases (Practical & Viva)	6	60	90
10	Clinics	6	60	90

### 5. Medium of instruction and examinations

The medium of instruction and examination for all core papers shall be in English.

### 6. Practical training

Being practical oriented program, the focus will be more for practical training. The candidate shall undergo hospital inpatient and outpatient care training continuously throughout the course.

### 7. Requirement to appear for examination

Candidate should put in a minimum of 90 % attendance to appear for examinations.

### 8. Passing minimum

To pass

- A candidate should secure a minimum of 50 % in the practical and theory separately to pass the examination. A candidate failing in any one subject will have to reappear for that particular subject only in the supplementary examinations.
- A candidate should secure 50 % marks in the internals.

### 9. Classification of successful candidate

- a) All candidates securing not less than 75 % of the aggregate marks in part III shall be declared to have passed in **FIRST CLASS WITH DISTINCTION** provided they

have passed the examination in every subject without failure at anytime during the course of the study.

- b) All candidates securing not less than 60 % of the aggregate marks in part III shall be declared to have passed in **FIRST CLASS** provided they have passed the examination in every subject.
- c) Other successful candidates shall be declared to have passed the examination in **SECOND CLASS**.

### **10. Conferment of the degree**

A candidate who has passed all the examinations as prescribed shall be eligible to receive the “**Bachelor of Science (Optometry)**” from the Bharathiar University.

### **11. Ranking**

Candidates who have passed in all the examinations in the very first attempt and secured the first five positions in aggregate will be awarded the first five University ranks.

### **12. Revision of regulations and syllabus**

The syllabus and regulations of the course are subject to modification by the concerned board whenever necessary.

### **13. Question paper pattern**

Theory exams will be for 100 marks with the following components

Multiple Choice / one word answers:  $20 \times 1 = 20$  marks (no choice)

Short notes (100 words / one paragraph):  $5 \times 6 = 30$  marks (either/or type)

Descriptive (300 words 1 ½ page):  $5 \times 10 = 50$  marks (either/or type)

### **14. Institutional requirement for the conduct of the course**

The course shall be conducted in a medical institution with full facilities in all major divisions like OP, IP, Laboratories. OT and with all basic departments of a hospital like medicine; surgery etc., there must be a coordinator for the course. He / She must be one of the full time medical staff of the hospital.

## **SYLLABUS AND CURRICULUM CORE OBJECTIVES**

This programme will enable those passing out to become optometrists who can undertake

1. Correction of refractive errors of eye and prescription of glasses
2. Detection of ocular and related systemic and neurological diseases
3. Designing and fitting of contact lenses, aniseikonic lenses and low vision aids
4. Diagnosis and orthoptic treatment of oculomotor malfunctions such as heterophoria and strabismus
5. Public health optometry in schools, colleges, urban slums, rural areas and occupational optometry in industries
6. Optometric counseling of patients with partial sight & colour blindness
7. Evaluation of the health status of the eye and visual system and referral of patients to the specialist at the appropriate stage
8. Detection of pathological conditions at an early stage and immediate referral of the patient to the specialist
9. Vision rehabilitation and follow up work of discharged patients
10. Public education on ocular hygiene and related nutritional and environmental counseling

They will however not be expected to undertake surgery or application of medicine required for the other than those absolutely discharge of their optometric functions.

# **FIRST YEAR**

## **PAPER – I TAMIL (LANGUAGE) (THEORY)**

## **PAPER – II ENGLISH**

**\* Syllabus of School of Distance Education (Part I and Part II of B. Sc (Comp.Sc)/ BBA/B.Com) shall be followed**

## **PAPER – III PHYSICAL OPTICS**

### **UNIT – 1: Nature of light:**

- 1.1 Wave Nature of Light - Short coming of wave theory
- 1.2 Quantum Theory - Dual Nature of Light
- 1.3 Mathematical Representation of Wave – S.H.M. - energy composition of S.H.M. in a straight line and right angles
- 1.4 Hugen’s principle - Laws of reflection and refraction at spherical surfaces and lenses.
- 1.5 Description of the phenomena of interference, Young’s experiment, coherent sources, phase and path difference, intensity, Theory of interference fringes.
- 1.6 Interference in thin films - Interference due to reflected and transmitted light – Lloyd’s single mirror
- 1.7 Colours of thin films - wedge shaped thin films – testing of planeness of surface
- 1.8 Newton’s rings experiment - refractive index of liquid
- 1.9 Non-reflecting films
- 1.10 Visibility of fringes - contrast and contrast threshold.

### **UNIT – 2: Radiometry & Photometry:**

- 2.1 Radiant intensity
- 2.2 Irradiance
- 2.3 Lambert’s cosine Law
- 2.4 Basic concepts and definitions in Photometry
- 2.5 Reflection co-efficient, transmission co-efficient, power-transmitted and Reflected
- 2.6 Lumen Brodhun Photometer

### **UNIT – 3: Diffraction and scattering**

- 3.1 Single slit, qualitative and quantitative
- 3.2 Circular aperture
- 3.3 Double slit pattern and Kirchoff’s integral
- 3.4 Multiple slits - grating
- 3.5 Reflection grating and the zone plate
- 3.6 Rayleigh’s scattering
- 3.7 Raman scattering

## **UNIT –4: Polarisation**

- 4.1 Polarisation of transverse waves - light as transverse waves
- 4.2 Double refraction, principal plane, nicol prism - plane polarization
- 4.3 Circular elliptic polarization production, detection and behavior
- 4.4 Optical activity - Fresnel's half shade polarimeter
- 4.5 Polarisation by selective absorption – dichroism.

## **UNIT – 5: Spectrum**

- 5.1 Sources of spectrum. Bunsen - carbon - mercury - sodium
- 5.2 Emission and absorption spectra -classification - visible - ultra violet and infra spectra  
- electromagnetic spectrum

## **PAPER IV - GEOMETRIC OPTICS**

### **UNIT-1: PROPERTIES OF LIGHT, REFRACTION THROUGH SPHERICAL SURFACES**

- 1.1 Rectilinear propagation, reflection, refraction, ray, beam.
- 1.2 Umbra, penumbra, pinhole camera
- 1.3 Introduction: Lens shapes, Vergences and conversion factors, divergence and convergence of wave fronts by spherical surfaces, definition of dioptre, Working of spherical lenses - primary and secondary focal points - predictable rays.
- 1.4 Prism diopter, Prentice's Law, deviations, Ophthalmic prisms - thin and thick
- 1.5 Spherical refracting interfaces - convex, concave, derivation of vergence equation, sagittas, dioptric power - focal points, nodal points and plane. Symmetry points, imaging examples, lateral magnification.
- 1.6 Thin lens equation - lenses in contact separated. Two lens systems - reduced system – vergence effectively equation.
- 1.7 Application - calculation of image points, dioptric powers in reduced systems using vergence techniques.
- 1.8 Thick lenses - front and back vertex powers - reduced system - dioptric power of equivalent lenses, cardinal points. Application - to calculate to the equivalent dioptric power, of thick meniscus lens, plano convex vertex powers, position of principal planes. Dioptric powers using reduced systems. Matrix theory and lens matrices.
- 1.9 Cylindrical and spherocylindrical lenses: principle meridians, refraction by a cylindrical lens, calculation of power in different meridians, spherocylindrical lenses, circle of least confusion, interval of Sturm, refraction through a spherocylindrical lens, writing Rx in different forms (+cyl., meridional), additional spherocylinders, oblique-cylinders.

### **UNIT-2: STOPS AND PUPILS:**

- 2.1 Aperture stop
- 2.2 Entrance pupil and exit pupil
- 2.3 Field stop
- 2.4 Entrance port and exit port, field of view, vignetting
- 2.5 Depth of field and depth of focus



### **UNIT-3: ABERRATIONS & OPTICAL SYSTEM:**

- 3.1 Dispersion by a prism - angular dispersion - dispersive power - Dispersion without deviation and deviation without dispersion.  
Achromatic prisms
- 3.2 Chromatic aberrations - cause and methods of minimizing, achromatic doublet
- 3.3 Monochromatic aberrations - first order and third order theory
- 3.4 Spherical aberrations, coma, astigmatism, curvature, distortion - cause and the methods of minimizing aberrations
- 3.5 Tangent condition for elimination of distortion.
- 3.6 Point spread function
- 3.7 Modulation transfer function
- 3.8 Fourier imaging theory

### **UNIT-4: OPTICAL INSTRUMENTS:**

- 4.1 Spectrometer
- 4.2 Simple and compound microscope
- 4.3 Telescope
- 4.4 Magnifying power of simple and compound microscope, telescope
- 4.5 Resolving power of optical instrument
- 4.6 Resolving power of the eye
- 4.7 FIBRE OPTICS
- 4.8 LASER OPTICS:

Basic laser principles - spontaneous and stimulated emission. Coherence - spatial, temporal, Laser pumping - population inversion optical feedback

Gas lasers, and solid lasers, Helium neon laser – argon – ion laser – ruby laser.

Monocular laser – carbondioxide, eximer laser. Semi conductor lasers. Lasers in medicine ophthalmic applications

Lens shapes, Vergences and conversion factors, divergence and convergence of wave fronts by spherical

### **UNIT-5: PRINCIPLES OF LIGHTING**

- 5.1 Modern theory on light & colour: Synthesis of light
- 5.2 Additive and subtractive synthesis of colour
- 5.3 Visual task: Factors affecting visual tasks
- 5.4 Light & vision: Discomfort glare, visual ability, relationship among Lighting, visibility and task performance
- 5.5 Light sources: Modern light sources - spectral energy distribution - luminous efficiency - colour temperature - colour rendering
- 5.6 Illumination: Luminous flux, candela, solid angle, illumination, Utilization factor, depreciation factor, illumination laws
- 5.7 Lighting system Design: Design approach, Design Process, Concept of Lighting design, physical consideration and psychological consideration and types of lighting.
- 5.8 Photometry: Measurement of illumination, photometers and filters.

## **PAPER - V GENERAL ANATOMY & OCULAR ANATOMY**

### **INTRODUCTION**

Anatomy and its sub - division, planes of the body, terms in relation of structures, Regional Anatomy, organ system.

### **UNIT-1: Tissues of the body (Histology of the body tissues)**

- 1.1 Epithelium
- 1.2 Connective tissue
- 1.3 Bone and cartilage
- 1.4 Muscles: Skeletal, Plain, heart muscle
- 1.5 Blood vessels
- 1.6 Neuron, Neuroglia
- 1.7 Glands exocrine and endocrine
- 1.8 Skin and appendages
- 1.9 Lymphoid Tissues

### **UNIT-2: Organ systems: (General plan)**

- 2.1 Locomotor system: Bones, muscles, joints.
- 2.2 Cardiovascular systems: Heart, Regional blood vessels – arteries, veins
- 2.3 Lymphatic system including immuno system
- 2.4 Digestive system
- 2.5 Respiratory system
- 2.6 Reproductive system
- 2.7 Endocrine system

### **UNIT-3: ANATOMY OF CENTRAL NERVOUS SYSTEM**

Central nervous system spinal and brain stem, cerebellum, cerebrum

### **UNIT-4: OCULAR ANATOMY**

- 4.1 Eye – Sclera, cornea, choroid, ciliary body, iris, etina
- 4.2 Refractory media - Aqueous humor, anterior chamber, posterior chamber Lens, vitreous body
- 4.3 Eyelids, conjunctiva

### **UNIT-5: DEVELOPMENT OF EYE AND ADENEXA**

#### **PRACTICAL**

- 5.1 Eye: Practical dissection of Bull's eye
- 5.2 Orbit: Practical demonstration of orbital structure.

## **PAPER - VI GENERAL PHYSIOLOGY & OCULAR PHYSIOLOGY**

### **UNIT-1: GENERAL PHYSIOLOGY**

- 1.1 Cell structure and organization
- 1.2 Gene action
- 1.3 Tissue organization
- 1.4 Epithelium

- 1.5 Connective tissue - Collagen fibers - elastic fibers - areolar fibers - cartilage - bone
- 1.6 Contractive tissue - striated - skeletal - cardiac - non striated - plain myoepithelial
- 1.7 General principles of cell physiology
- 1.8 Electrophysiology of cells
- 1.9 Physiology of skeletal muscles

## **UNIT-2:PHYSIOLOGY OF BLOOD**

- 2.1 Composition
- 2.2 Volume measurement and variations
- 2.3 Plasma proteins - classification and functions
- 2.4 Red blood cells - development, morphology and measurement - functions and dysfunctions
- 2.5 White blood cells - development - classifications, morphology - functions and dysfunctions
- 2.6 Platelets - morphology - development, functions and dysfunctions
- 2.7 Clotting - factors - mechanism - anticoagulants – dysfunctions
- 2.8 Blood grouping - classifications - importance in transfusion Rh factor and incompatibility
- 2.9 Suspension stability
- 2.10 Osmotic fragility
- 2.11 Reticulo endothelial system
- Spleen - lymphatic tissue
- Thymus - Bone marrow
- Immune system - Cellular - humoral - autoimmune

## **UNIT-3: PHYSIOLOGY OF VARIOUS SYSTEMS**

- 3.1 General arrangement
- 3.2 Salivary digestion - functions and regulations
- 3.3 Gastric digestion - functions and regulations
- 3.4 Pancreatic digestion - functions and regulations
- 3.5 Intestinal digestion - functions and regulations
- 3.6 Liver and Bile
- 3.7 Absorption
- 3.8 Motility
- 3.9 Body fluids – distribution, measurement and exchange.
- 3.10 Kidney – structure of nephron - mechanism of urine formation – composition of 3.11 urine and abnormal constituents - urinary bladder and micturition
- 3.12 Endocrine system
- Hormone mechanism - negative feedbacks- tropic action – Permissive action – cellular actions
- hypothalamic regulation
- Hypothesis - Hormones, actions, regulations
- Thyroid - Hormones, actions, regulations
- Adrenal cortex - Hormones, actions, regulations
- Adrenal medulla - Hormones, actions, regulations
- Parathyroid - Hormones, actions, regulations
- Islets of pancreas ` - Hormones, actions, regulations
- 3.13 Reproduction
- Male reproductive system - control and regulation - semem analysis

Female Reproductive system - Uterus – ovaries – menstrual cycle – Regulation Pregnancy and delivery – breast – family planning

### 3.14 Respiration

Mechanics of respiration – pulmonary function tests – Transport of respiratory gases – neural and chemical regulation of respiration – hypoxia – cyanosis – dyspnoea – asphyxia

### 3.15 Circulation

General principles

Heart: myocardium – innervations – transmission of cardiac impulse –

Events during cardiac cycle – cardiac output

## **UNIT-4: PHYSIOLOGY OF NERVOUS SYSTEM**

4.1 Neuron – conduction of impulse – synapse – receptor. Sensory organization – pathways and perception. Reflexes – cerebral cortex – functions. Thalamus – basal ganglia

4.2 Cerebellum

4.3 Hypothalamus

4.4 Special senses (elementary)

## **UNIT-5: OCULAR PHYSIOLOGY**

1. Protective mechanisms in the eye. Eyelid and lacrimation, descriptive of the globe
2. Extrinsic ocular muscles, their action and control of their movements
3. Coats of the eyeball
4. Cornea
5. Aqueous humour and vitreous
6. Intra ocular pressure
7. Iris and pupil
8. Crystalline lens and accommodation – presbyopia
9. Retina structure & function
10. Vision – general aspects of sensation
11. Pigments of the eye and photo chemistry
12. The visual stimulus, refractive errors
13. Visual acuity
14. Visual perception-binocular vision, stereoscopic vision, optical illusion
15. Visual pathway, central & cerebral connections, lesions of pathways & effects
16. Colour vision and colour vision defects

## **GENERAL PHYSIOLOGY – DEMONSTRATION**

1. Microscope
2. Haemocytometer
3. Blood
  - a. RBC count
  - b. Hb
  - c. WBC count
  - d. Differential count
  - e. Het Demonstration
  - f. ESR

- g. Blood group and Rh type
- h. Bleeding time and clotting time
- 4. Examination of urine
  - a. Specific Gravity
  - b. Albumin
  - c. Sugar
  - d. Microscopic examination for cells and cyst
- 5. Clinical examination of circulatory system
  - a. Measurement of blood pressure and pulse rate
  - b. Effect of exercise on blood pressure and pulse rate

## **PAPER - VII GENERAL BIOCHEMISTRY & OCULAR BIOCHEMISTRY**

### **UNIT-1: GENERAL BIOCHEMISTRY**

- 1.1 Buffers – definition – blood buffers – mechanism of buffer action – H<sup>+</sup> and PH measurement
- 1.2 Biological macromolecules – glycosaminoglycans – collagens – plasma proteins – muscle proteins – nucleic acids.
- 1.3 Enzymes – criteria for enzyme action – clinically important enzymes
- 1.4 Fundamentals of biological oxidative reactions-ATP formation
- 1.5 Fundamentals of intermediary metabolism – EMP-HMP-TCA pathways – NADPH – Fats
- 1.6 Urea cycle – important amino acids – common transamination reactions

### **UNIT-2: BIOCHEMISTRY OF METABOLISM**

- 2.1 Elements of protein Metabolism
- 2.2 Lipid metabolism -  $\beta$  oxidation of fatty acids – synthesis – essential fatty acids – cholesterol – phospholipids – phosphoinositides-biological membranes – prostaglandins
- 2.3 Carbohydrate Metabolism

### **UNIT-3: VITAMINS AND MINERALS**

- 3.1 Important Vitamins A, B, C, E and inositol
- 3.2 Regularly mechanisms of ophthalmologic ally important vitamins
- 3.3 Minerals and trace metals – Copper, Iron, Calcium, Magnesium, Phosphorous, Sodium, Potassium, Zinc, Selenium.
- 3.4 Free radicals – Biological reactions – oxidants – antioxidants – diseases – Therapeutic uses of antioxidants

### **UNIT-4: BIOCHEMISTRY OF ANTERIOR SEGMENT OF EYE**

- 4.1 Importance of ocular biochemistry in clinical optometric practice.
- 4.2 Tear film – composition – lipid layer – aqueous layer – mucoid layer- functions-dysfunction- diagnostic tests –tear substitutes- recent development.
- 4.3 Cornea – biochemical composition of epithelium – bowman’s layer – stroma – descemets layer – endothelium – functions – corneal metabolism

- nutrient uptake energy – transparency – barrier mechanism – pump action
- irrigating solutions – aging and other anomalies – recent developments.
- 4.4 Lens – composition – metabolism – glucose utilization – sorbitol pathways
  - glutathione and ascorbic acid transport – transparency – cataract formation
  - aging photooxidation – sugar cataract – cataract and ascorbic acid act
- 4.5 Aqueous humour – composition – function – ciliary body – aqueous humour production – IOP- Glaucoma

## **UNIT-5: BIOCHEMISTRY OF POSTERIOR SEGMENT OF EYE**

- 5.1 Vitreous humour – structure – composition functions – vitreous biochemical pathology – intraocular gels – recent developments
- 5.2 Retina – Pigment epithelium – structure – composition – photoreceptor cells – rhodopsin – lipids renewal – inner segment
- 5.3 Pigment epithelium – choroid – metabolism and function – phagocytosis – vitamin A-retinal function and metabolism.
  - Retinal neurochemistry
  - Monoamines – acetyl choline – gaba – amino acids – taurine – neuropeptides
  - Biochemical correlates of retinal diseases.

## **PAPER – VIII PHYSIOLOGY & NUTRITION**

### **UNIT-1: INTRODUCTION**

- 1.1 History of nutrition
- 1.2 Nutrition as science
- 1.3 Food groups, RDA
- 1.4 Balanced diet, diet planning
- 1.5 Assessment of nutritional status
- 1.6 Units of energy
- 1.7 Measurement and energy value of food
- 1.8 Energy expenditure
- 1.9 Total energy / Calorie requirement for different age groups and diseases
- 1.10 Satiety value
- 1.11 Energy imbalance – Obesity, starvation
- 1.12 Limitations of daily food guide

### **UNIT-2: PROTEINS**

- 2.1 Sources and functions
- 2.2 Essential and non essential amino acids
- 2.3 Incomplete and complete proteins
- 2.4 Supplementary foods
- 2.5 PEM and the eye
- 2.6 Nitrogen balance
- 2.7 Changes in the protein requirement

### **UNIT-3: FATS**

- 3.1 Functions and sources
- 3.2 Essential fatty acids
- 3.3 Excess and deficiency
- 3.4 Lipids and the eye
- 3.5 Hyperlipidemia, Heart diseases, Atherosclerosis.

### **UNIT-4: MINERALS**

- 4.1 General functions and sources.
- 4.2 Macro and micro minerals associated with the eye.
- 4.3 Deficiencies and excess- ophthalmic complications  
Example: iron, calcium, iodine etc.

### **UNIT-5: VITAMINS**

- 5.1 General functions
- 5.2 Food sources
- 5.3 Vitamin deficiencies and associated eye disorders with particular emphasis  
Vitamin A
- 5.4 Promoting sound habits in pregnancy, lactation and infancy
- 5.5 Nutrients with antioxidant
- 5.6 Properties
- 5.7 Measles and associated eye disorders, low birth weight

### **PAPER – IX PRACTICALS: PHYSICAL OPTICS (Practical & Viva)**

1. Refractive index of prism for sodium D-Line using spectrometer
2. Dispersive power of prism for Hg source using spectrometer
3. Air wedge - Interference method to find diameter of an optically thin wire
4. Newton's ring - to find  $\lambda$  of sodium light
5. Biprism - To find  $\lambda$  of sodium light
6. Diffraction grating - (Minimum deviation method).  $\lambda$  of Hg prominent lines
7. Polarimeter - specific rotation of dextrose and concentration of IV injection
8. Lumen brodem Photometer - Comparison of luminous power
9.  $\mu$  of liquid - using liquid prism - spectrometer
10. Michelson interferometer -wavelength of laser light

### **PAPER – X PRACTICALS: GEOMETRIC OPTICS (Practical & Viva)**

1. 'f' &  $\mu$  of convex lens (f by u-v and shift method)
2. 'f' &  $\mu$  of concave lens (f of concave lens by u-v method, combined lens u-v method, R - Boy's method)
3.  $\mu$  of the prism (i-d curve)
4.  $\mu$  of slab - shift method (traveling microscope)
5.  $\mu$  of liquid - shift method (traveling microscope)

6. 'f' of convex of mirror
7. 'f' of concave mirror (u-v graph)
8. Verification of laws of reflection - plane mirror
9. Verification of laws of refraction - glass slab - pin method ( $\mu$  by lateral shift)
10. Resolving power of telescope
11. Photodiode - characteristics
12. Plank's constant

## REFERENCE BOOKS:

### ANATOMY

- |                                      |                           |
|--------------------------------------|---------------------------|
| 1. Human Anatomy                     | B.D.Chaurasia             |
| 2. Human Anatomy                     | A.K.Dutta                 |
| 3. Text book of Human Anatomy        | H.Gray                    |
| 4. Anatomy and Physiology of the Eye | A.K.Khurana, Indu Khurana |
| 5. Clinical Anatomy of the Eye       | S.Snell, A.Lamp           |

### PHYSIOLOGY

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| 1. Text book of Medical Physiology | Guyton                                |
| 2. Human Physiology                | Chaudary                              |
| 3. Human Physiology                | Chatterjee                            |
| 4. Adler's Physiology of the Eye   | Robert.A.Meoses,<br>William.M.Hart Jr |

### BIO-CHEMISTRY

- |                              |                 |
|------------------------------|-----------------|
| 1. Text book of biochemistry | Sitaram Acharya |
| 2. Text book of biochemistry | A.C.Deb         |
| 3. Biochemistry              | S.K.Dasgupta    |



# **SECOND YEAR**

## **PAPER – I OPTOMETRIC OPTICS**

### **UNIT-1 : SPECTACLE LENSES**

- 1.1 Introduction to spectacle lenses
- 1.2 Forms of lenses
- 1.3 Cylindrical and spherocylindrical lenses
- 1.4 Properties of crossed cylinders
- 1.5 Toric lenses, toric transposition
- 1.6 Astigmatic lenses
- 1.7 Axis Direction of astigmatic lenses
- 1.8 Obliquely crossed cylinders
- 1.9 Sag Formulae
- 1.10 Miscellaneous spectacle lenses
- 1.11 Vertex distance and vertex power
- 1.12 Tilt induced power
- 1.13 Aberrations in ophthalmic lenses
- 1.14 Fresnel prisms, Lenses and Magnifiers
- 1.15 Manufacture of glass
- 1.16 Lens surfacing
- 1.17 Principle of surface generation and glass cements
- 1.18 Lens quality
- 1.19 Faults in lens material
- 1.20 Faults on lens surface
- 1.21 Inspecting the quality of lenses
- 1.22 Toughened lenses

### **UNIT-2: OPHTHALMIC LENSES**

- 2.1 Definition of prisms, Units of prism power
- 2.2 Thickness difference and Base apex notations
- 2.3 Dividing, Compounding and Resolving prisms
- 2.4 Rotary prisms and effective prism power in near vision
- 2.5 Prismatic effect, decentration, Prentice Rule
- 2.6 Prismatic effect of spherocylinders and Plano cylinders
- 2.7 Differential prismatic effects

### **UNIT-3: Tinted and protective lenses**

- 3.1 Characteristics of tinted lenses
- 3.2 Absorptive Glasses
- 3.3 Polarising Filters
- 3.4 Photochromic Filters
- 3.5 Reflecting filters
- 3.6 Bifocal lenses

- 3.7 Trifocal lenses
- 3.8 Progressive addition lenses
- 3.9 Lenticular lenses
- 3.10 Reflection from spectacle lenses, ghost images, Reflections in bifocals at the dividing line
- 3.11 Antireflection coating, antiscratch coating, antifog coating, Mirror coating, edge coating, Hard Multi Coating (HMC)
- 3.12 Field of view of lenses
- 3.13 Size, shape of view of lenses
- 3.14 Aspherical lenses

#### **UNIT-4: SPECTACLE FRAMES**

- 4.1 Types and parts
- 4.2 Classification of spectacle frames-material, weight, temple, position, coloration
- 4.3 Frame construction, frame measurements and markings

#### **UNIT-5: DISPENSING OPTICS**

- 5.1 Surfacing and polishing glass lenses
- 5.2 Glazing
- 5.3 Frame manipulation and repair
- 5.4 Facial measurements and frame choice
- 5.5 Frame and dimension measurements of complete pair of spectacles
- 5.6 Complete dispensing for subjects.
- 5.7 Special lenses – examination of specimens
- 5.8 Lens faults in sections
- 5.9 Measurements of assorted faces for spectacle
- 5.10 Making and edging of bifocal lenses
- 5.11 Edging of lenses for plastic, metal and rimless frames
- 5.12 Joining plastics by different solvents

#### **PAPER – II VISUAL OPTICS**

##### **UNIT-1: REVIEW OF GEOMETRIC OPTICS**

- 1.1 Vergence and power
- 1.2 Conjugacy, Object space and image space
- 1.3 Sign convention
- 1.4 Spherical Mirror, catoptric power
- 1.6 Cardinal points
- 1.7 Magnification

##### **UNIT-2: OPTICS OF OCULAR STRUCTURES**

- 2.1 Cornea and aqueous
- 2.2 Crystalline lens
- 2.3 Vitreous
- 2.4 Schematic and reduced eye

- 2.5 Corneal curvature and thickness
- 2.6 Keratometry
- 2.7 Curvature of the lens and ophthalmophakometry
- 2.8 Axial and axis of the eye

### **UNIT-3: REFRACTIVE ANOMALIES AND TIHEIR CAUSES**

- 3.1 Etiology of refractive nomalies
- 3.2 Contributing variabilities and their ranges
- 3.3 Populating distributions and their ranges
- 3.4 Optical component measurement
- 3.5 Growth of eye in relation to refractive errors
- 3.6 Emmetropia
- 3.7 Myopia
- 3.8 Hyperopia
- 3.9 Astigmatism
- 3.10 Anisometropia And Aniseikonia
- 3.11 Presbyopia
- 3.12 Aphakia and pseadophakia
- 3.13 Correction and management of Amblyopia

### **UNIT-4: FAR AND POINTS OF ACCOMODATION AND VERTEX DISTANCE**

- 4.1 Correction of spherical Ametropia
- 4.2 Axialo versus refractive ametropia
- 4.3 Relationship between Occomodation and convergence, A/C Ratio
- 4.4 Ocular refraction versus spectacle refraction
- 4.5 Ocular accommodation versus spectacle accommodation
- 4.6 spectacle magnification and relative spectacle magnification
- 4.7 Retinal image blur. Depth of focus and depth of field

### **UNIT-5: RETINOSCOPY PRINCIPLES AND METHODS**

- 5.1 Retinoscopy-speed of reflex and optimum condition
- 5.2 Retinoscopy-Dynamic and Static
- 5.3 Review of objective refractive method
- 5.4 Cross cylinder method for astigmatism, astigmatic fan test
- 5.5 Difficulties in objective tests and their avoidance
- 5.6 Transposition oflenses
- 5.7 Spherical equivalent
- 5.8 Prescribing prism
- 5.9 Binocular Refraction

## **PAPER – III OPTOMETRIC INSTRUMENTS & CLINICAL EXAMINATIONS OF VISUAL SYSTEM**

### **UNIT-1: REFRACTIVE INSTRUMENTS**

- 1.1 Test charts standards, choice of test charts
- 1.2 Trail case lenses-Best form lenses

- 1.3 Refractor head units, optical considerations of refractor units
- 1.4 Trial frame design
- 1.5 Near vision difficulties with units and trial frame
- 1.6 Retinoscope-types available
- 1.7 Adjustments of retioscopes – special features
- 1.8 Cylinder retinoscopy
- 1.9 Interpretation of objective findings
- 1.10 Interpretation of objective tests-polarising and displacement etc, simultan test
- 1.11 Projection charts
- 1.12 Illumination of the consulting room special instruments
- 1.13 Brightness acuity tester
- 1.14 Vision analyzer
- 1.15 Video acuity test
- 1.16 Pupilometer
  - ILnsometer, lens gauge or clock
  - Refractionometer
  - keratometer and corneal topography

## **UNIT-2: OTHER INSTRUMENTS**

- 2.1 Slit lamp
- 2.2 Tonometer – Principles, uses and types
- 2.3 Ophthalmoscopes and related devices

## **UNIT-3: SPECIAL EQUIPMENTS**

- 3.1 Fundus camera
- 3.2 Orthoptic instruments
- 3.3 Colour vision testing devices
- 3.4 Fields of vision and screening devices
- 3.5 Ophthalmic ultra sonography - ultrasound/ A scan/ Bscan/ UBM
- 3.6 Electodiagnostics - ERG/VPG/EOG
- 3.7 Nervefiber analyzer
- 3.8 Scanning laser devices

## **UNIT-4: CLINICAL EXAMINATION OF THE VISUAL SYSTEM (60 hour)**

- 4.1 History of the ophthalmic subject
- 4.2 Ocular symptoms, the past prescriptions-it's influence
- 4.3 Visual acuity testing-distance and near and colour vision
- 4.4 Examination of muscle balance
- 4.5 Examination of eye lids, conjunctiva & sclera
- 4.6 Examination of cornea, lens
- 4.7 Examination of iris, ciliary body and pupil

## **UNIT-5: SPECIAL EXAMINATIONS**

- 5.1 Examination of intraocular pressure & Examination of angle of anterior chamber
- 5.2 Ophthalmoscopy – (direct and indirect)

- 5.3 Examination of fundus
- 5.4 Examination of lacrimal system
- 5.5 Examination of orbit
- 5.6 Macular function test
- 5.7 Visual. Field charting – (central and peripherers)
- 5.8 Neuro-ophthalmological examination

## **PAPER – IV GENERAL PHARMACOLOGY & OCULAR PHARMACOLOGY**

### **UNIT-1: GENERAL PHARMACOLOGY**

- 1.1 Introduction and sources of drugs
- 1.2 Routes of drug administration
- 1.3 Pharmacokinetics-special emphasis on ocular pharmacokinetics
- 1.4 Pharmacokinetics
- 1.5 Adverse drug reactions-Special emphasis on ocular toxicity of drugs
- 1.6 Factors modifying drug action

### **UNIT-2: SYSTEMIC PHARMACOLOGY**

- 2.1 Autonomic Nervous System
  - Introduction. Neurotransmitters, Their Mechanism Of Action
  - Drugs Affecting-
    - Pupillary Size And Light Reflex
    - Intraocular Tension
    - Accommodation
    - Skeletal Muscle Relaxants
- 2.2 Cardiovascular System
  - Antihypertensives And Drugs Useful In Angina
- 2.3 Central Nervous System
  - Alcohol. Sedative Hypnotics, General Anesthetics, local anesthetics, Opioids and non opioids

### **UNIT-3: OTHERS**

- 3.1 Chemotherapy
  - Introduction, general chemotherapy
  - Specific chemotherapy
    - Antifungal
    - Antiviral
    - Antitubercular
    - Antileprotic
- 3.2 Hormones
  - Corticosteroids, Antidiabetics
- 3.3 Blood
  - Coagulants
- 3.4 Diuretics

#### **UNIT-4: OCULAR PHARMACOLOGY**

- 4.1 Ocular preparations, formulations and requirements of an ideal agents
- 4.2 Ocular pharmacokinetics-Methods of drug administration, Special drug delivery systems
- 4.3 Ocular toxicology

#### **UNIT-5: DIAGNOSTIC AND THERAPUTIC APPLICATIONS OF DRUGS IN OPHTHALMOLOGY**

- 5.1 Agents used to aid diagnosis
- 5.2 Drugs and biological agents used in ocular surgery
- 5.3 Anesthetics used in ophthalmic procedures
- 5.4 Drug treatment of glaucoma, accommodative esotropia and ocular myasthenia
- 5.5 Pharmacotherapy of ocular infections-Bacterial, Viral, Fungal, Chlamydial
- 5.6 Drugs used in inflammatory disorders of the eye
- 5.7 Drugs used in inflammatory disorders of the eye.
- 5.8 Drug treatment of degenerative disorders of the eye
- 5.9 Immunomodulators in ophthalmic practice
- 5.10 Use of other agents in ophthalmic practice
- 5.11 Use of other agents in ophthalmic practice
  - Enzymes
  - Vitamins
  - Trace elements
  - Antioxidants
  - Wetting agents
  - Tear substitutes

#### **PAPER – V MICROBIOLOGY & PATHOLOGY**

**UNIT -1:** Sterilization and disinfection generally used in laboratory and hospital practice

**UNIT -2:** Details of common bacteria, viruses and other organisms

- 2.1 Morphology and principles of cultivation of bacteria
- 2.2 Common bacterial infections of the eye

**UNIT -3:** Common fungal, viral and parasitic infections of the eye

#### **UNIT-4: PATHOLOGY**

- 4.1 General introduction - 2. Inflammation and repair
- 4.2 Infections (Tuberculosis, Leprosy, Syphilis, Fungus, Virus, Chlamydiae)
- 4.3 Genetic abnormality
- 4.4 Haematology (anaemia, Leukemia, Bleeding disorders)
- 4.5 Circulatory disturbances (Shock, edema, Thrombosis, Infarction, Embolism)
- 4.6 Clinical pathology (Examination of urine and blood smears)

## **UNIT -5: OPHTHALMIC**

- 5.1 Ophthalmic wound healing
- 5.2. Eyelid (normal and pathology in degeneration and dystrophies)
- 5.3 Cornea (Normal and pathology in degeneration and dystrophies)
- 5.4 Lens (normal and pathology of cataract)
- 5.5 Retina (normal and pathology in inflammatory diseases, infections)
- 5.6 Intraocular tumours (Retinoblastoma and choroidal melanoma)
- 5.7 Orbit (inflammation and neoplasia)
- 5.8 Optic nerve (normal and tumours)

## **PAPER – VI STATICS AND OCCUPATIONAL OPTOMETRY**

### **UNIT-1: STATISTICS**

Introduction of collection of data- presentation including classifications and diagrammatic representations – frequency distribution Measures of central tendency; measures of dispersion

- 1.1 Correlation and regression (linear)
- 1.2 Probability-simple ideas
- 1.3 Theoretical distributions – binomial, normal
- 1.4 Sampling – necessity of methods and techniques
- 1.5 Chi – square test (2x2)

### **UNIT-2: HOSPITAL STATISTICS**

- 2.1 Introduction to biostatistics epidemiology
- 2.2 Measures of morality
- 2.3 Descriptive epidemiology
- 2.4 Biological variability
- 2.5 Screening
- 2.6 Sampling
- 2.7 Statistical significance
- 2.8 Correlation
- 2.9 Retrospective studies
- 2.10 Prospective studies
- 2.11 Randomized clinical trails
- 2.12 Association and causation
- 2.13 Bias and confounding
- 2.14 Sample size determination
- 2.15 Survival analysis

### **UNIT-3: LAW AND OPTOMETRY**

- 3.1 Legal environment techniques-History – law and equity
- 3.2 History and theory of licensure
- 3.3 Licensure as a means of internal and external discipline- unprofessional conduct  
incompetence-gross immorality
- 3.4 International optometry- important foreign optometry law
- 3.5 Optometrist in court

- 3.6 Malpractice-theory of liability-damages-minimizing malpractice claims
- 3.7 Insurances
- 3.8 Negligence
- 3.9 Ethics-Professional ethics
- 3.10 Laws governing practice of medical and paramedical profession in India
- 3.11 Registered medical council of India-dental council-nursing council
- 3.12 Present rules and regulations-laws regarding optical product Manufacturers-dispensing in India
- 3.13 Opticians – are they registered? Dispensing opticians-rules in UK

#### **UNIT-4: PUBLIC HEALTH AND COMMUNITY OPTOMETRY**

- 4.1 Global medicine and evolution of public health in India
- 4.2 Public health of optometry-concepts and implementation
- 4.3 Health care delivery systems in India and determinants of health
- 4.4 Levels of prevention-optometrist's role in community
- 4.5 Concepts of national health programme
- 4.6 Screening in population
- 4.7 Epidemiology of blindness-cataract, glaucoma, deficiency disorders
- 4.8 Scope of geriatric ophthalmology in preventive and rehabilitation care
- 4.9 Natural history of disease transmission of disease
- 4.10 Basics in research methodology in populations
- 4.11 Demography and vital statistics
- 4.12 National and international agencies in health plan
- 4.13 Fundamentals of health economics, health plan
- 4.14 Quality assessment in health delivery programmes

#### **UNIT-5: OCCUPATIONAL OPTOMETRY**

- 5.1 Introduction to occupational health, hygiene and safety International bodies like ILO WHO, national bodies like labour institutes, National institutes of occupational health, national safety council etc.

#### **PAPER – VIII PRACTICALS: VISUAL OPTICS (Practical & Viva)**

##### **PART I**

1. Study of purkinje images I & II, III & IV
2. Measurements of corneal curvature and corneal thickness
3. Mathematical models of the eye-Emmetropia, Hyperopia, & Myopia
4. Conjugate points-demonstration-worked examples
5. Axial and refractive hyperopia-worked examples
6. Axial and refractive Myopia-worked examples
7. Effect of lenses in front of the eye
8. Effect of prism in front of the eye
9. Vision through pinhole, slit filters etc.

##### **PART II**



1. Phorometry
2. Visual acuity Stereoacuity in emmetropia
3. Myopia and pseudomyopia, Myopia and visual acuity
4. Hypermetropia determination of manifest error subjectively
5. Myopic correction-subjective verification-monocular and binocular  
 Demonstration of astigmatism  
 Use of slit and keratometry to find principle meridians  
 Stigmatism-subjective verification tests.
6. Measurement of accommodation –near and far points and range
7. Presbyopic correction and methods – accommodative reserve balancing the relative accommodation –cross grid test
8. Methods of differentiating axial and refractive ametropia
9. Practice of retinoscopy-Emmetropia
  - Spherical ametropia
  - Simple astigmatism
  - Compound myopia and hyperopia
  - Oblique and irregular astigmatism
  - In media opacities
  - In strabismus and eccentric fixation
10. Interpretation of cycloplegic retinoscopic findings
  - Prescription writing
  - Binocular refraction
  - Vision therapy
  - Photo refraction
  - Exercise for vergence

**REFERENCE BOOKS:**

<b>Sl.No</b>	<b>BOKKS NAME</b>	<b>AUTHORS NAME</b>
	<b>OPTICS</b>	
1.	Fundamentals of optics	Jenkins/White
2.	Optics A.H.Tunnacliffe	J.G.Hirst
3.	Optics in Vision	Henri Obstfeld
4.	Optics Brijilal	
5.	Geometric, Physical, Visual optics	Michael.P.Keating
	<b>OPTOMETRIC OPTICS</b>	
1.	Principles of Ophthalmic lenses	M.Jalie
2.	System for Ophthalmic dispensing	Clifford.W.Brooks,Irwin,M.Borish
3.	Clinical Optics	Troy.Fannin,Theodore Grosvenor

## **VISUAL OPTICS**

- |  |                |
|--|----------------|
| 1. Duke Elder's Practice of Refraction | David Abrams   |
| 2. Clinical Refraction                 | Irwin.M.Borish |

## **OPTOMETRIC INSTRUMENTS & CLINICAL EXAMINATION**

- |                                     |  |
|-------------------------------------|--|
| 1. Optometric Instrumentation       | David.B.Henson                                     |
| 2. Clinical Ophthalmology (Vol.1)   | Thomous.D.Duane                                    |
| 3. Primary care Optometry           | TheodoreP.Grosvenor                                |
| 6. Clinical Procedures in Optometry | J.Boyd Eskside,<br>John.F.Amos<br>Jimmy.D.Bartlett |

## **PHARMACOLOGY**

- |                                       |  |
|---------------------------------------|--|
| 1. Essentials of medical Pharmacology | Tripati                                |
| 2. Optometric Pharmacology            | Jule Griebbrok<br>Jose,Kenneth.A.Polse |

## **MICRO BIOLOGY**

- |                               |                |
|-------------------------------|----------------|
| 1. Text book of Micro biology | Ananth Narayan |
|-------------------------------|----------------|

## **PATHOLOGY**

- |                           |             |
|---------------------------|-------------|
| 1. General Pathology      | Harsh Mohan |
| 2. Text book of Pathology | Robbins     |

## **OCCUPATIONAL OPTOMETRY**

- |  |  |
|--|--|
| 1. Industrial and Occupational Ophthalmology<br>Guide to Occupational and other visual needs<br>Samuel.L.Fox.Holmes. |  |
|--|--|

## **THIRD YEAR**

### **PAPER – I SQUINT AND BINOCULAR VISION**

#### **UNIT-1: SPATIAL SENSE**

- 1.1 Evolution of binocular vision
- 1.2 Binocular fusion, suppression, rivalry & summation
- 1.3 Visual direction, local sign & corresponding points

#### **UNIT-2: PANUM'S SPACE**

- 2.1 Stereopsis
- 2.2 Development of Binocular vision
- 2.3 The longitudinal horopter
- 2.4 Neural aspects of binocular vision
- 2.5 Visually guided behaviour and aniseikonia
- 2.6 ARC

#### **UNIT-3: QUALITATIVE & QUANTITATIVE DIAGNOSIS OF STRABISMUS**

- 3.1 Esodeviation
- 3.2 Exodeviation
- 3.3 A-V Phenomena
- 3.4 Cyclovertical squint
- 3.5 Pseudostrabismus

#### **UNIT-4: AMBLYOPIA AND ECCENTRIC FIXATION**

- 4.1 Treatment of amblyopia
- 4.2 Special forms of strabismus

#### **UNIT-5: NYSTAGMUS**

- 5.1 Non surgical management of strabismus

### **PAPER – II CONTACT LENS**

#### **UNIT-1: HISTORY OF CONTACT LENS**

- 1.1 Corneal anatomy and physiology
- 1.2 Corneal physiology and contact lens
- 1.3 Preliminary measurements and investigations
- 1.4 Slit lamp biomicroscopy
- 1.5 Contact Lens Materials
- 1.6 Optics of Contact Lens
- 1.7 Glossary of terms: Contact Lenses

#### **UNIT-2: INDICATIONS AND CONTRAINDICATIONS OF CL**

- 2.1 RGP contact lens design

- 2.2 Soft contact lens design
- 2.3 Keratometry, Placido's disc, Topography

### **UNIT-3: FITTING PHILOSOPHIES [INTRODUCTION TO CL FITTING]**

- 3.1 Handling of CL
- 3.2 Fitting of spherical soft CL and effects of parameter changes
- 3.3 Astigmatism: Correction options
- 3.4 Fitting spherical RGP CL, low DK and high DK
- 3.5 Effects of RGP CL parameter changes on lens fitting
- 3.6 Fitting in astigmatism
- 3.7 Fitting in keratoconus
- 3.8 Fitting in aphakia , pseudophakia
- 3.9 Lens care and hygiene instructions compliance
- 3.10 Follow up post fitting examination
- 3.11 Follow up slit lamp examination
- 3.12 Cosmetic CL
- 3.13 Fitting CL in children

### **UNIT-4: IC CL**

- 4.1 Bifocal CL
- 4.2 Continuous wear and extended wear CL
- 4.3 Therapeutic CL/Bandage lenses
- 4.4 CL following ocular surgeries
- 4.5 Disposable CL, Frequent replacement lenses
- 4.6 Use of secular microscopy and pachymetry in CL
- 4.7 Care of CL, CL solutions
- 4.8 Complications of CL
- 4.9 CL modification of finished lenses
- 4.10 Instrumentation in CL practice
- 4.11 Checking finished lens parameters
- 4.12 CL-special purpose-swimming,sports,occupational etc.
- 4.13 Recent developments in CL
- 4.14 Review of lenses available in India
- 4.15 Current CL research

### **UNIT-5: DISPENSING OPTICS**

- 5.1 Curvature and power measurements of typical contact lenses
- 5.2 Edging and polishing curves of contact lenses
- 5.3 Visit to factors making lenses and contact lenses

## **PAPER – III OCLUAR DISEASES**

### **UNIT-1: OCULAR ADNEXA**

- 1.1 Eye lid anatomy
- 1.2 Congenital and developmental anomalies of eyelids

- 1.3Blepharospasm
- 1.4Ectropion and entropion
- 1.5Trichiasis and symblepharon
- 1.6Eyelid inflammations
- 1.7Eyelid tumours
- 1.8Ptosis
- 1.9Eyelid retractions
- 1.10Eyelid trauma
- 1.11Lacrimal anatomy
- 1.12Lacrimal pump
- 1.13Methods of lacrimal evaluation
- 1.14Congenital and developmental anomalies of lacrimal system
- 1.15Lacrimal obstructions
- 1.16Lacrimal sac tumours
- 1.17Lacrimal trauma
- 1.18Ectasia and staphyloma
- 1.19Scleritis and episleritis
- 1.20Orbital anatomy
- 1.21incidence of orbital abnormalities
- 1.22Methods of orbital examinations
- 1.23Congenital and developmental anomalies of orbit
- 1.24Orbital tumours
- 1.25ital inflammations
- 1.26inus disorders affecting the orbit
- 1.27Orbital trauma
- 1.28Nflammation
- 1.29Therapeutic principles, specific inflammatory diseases
- 1.30Tumors
- 1.31Tumours of epithelial origin
- 1.32Glandular and adenexal tumours
- 1.33Tumours of neuroectndermal origin
- 1.34Vascular tumours
- 1.35Xanthomatous lesions
- 1.36Inflammatory lesions
- 1.37Metastatic tumours
- 1.38Degenerations and dystrophies
- 1.39Definitions
- 1.40Degenerations and dystrophies
- 1.41Miscellaneous conditions
- 1.42Keratoconjunctivitis Sicca
- 1.43Tear function tests
- 1.44Steven Johnson Syndrome
- 1.45Ocular Rosacea
- 1.46Atopic eye disorders
- 1.47Benign Mucosal Pemphigoid – ocular pemphigoid

- 1.48 Vitamin A deficiency
- 1.49 Metabolic diseases associated with corneal changes

## **UNIT-2: LENS**

- 2.1 Anatomy and pathophysiology
- 2.2 Normal anatomy and aging process
- 2.3 Developmental defects
- 2.4 Acquired lenticular defects
- 2.5 Management of lenticular defects

## **UNIT-3: UVEAL TRACT**

- 3.1 Congenital anomalies
- 3.2 Primary and secondary diseases of iris and ciliary body
- 3.3 Tumours
- 3.4 Anomalies of pupillary reactions
- 3.5 Congenital anomalies of choroids
- 3.6 Diseases of choroids
- 3.7 Tumours

## **UNIT-4: VITREOUS AND RETINA**

- 4.1 Developmental abnormalities
- 4.2 Hereditary hyaloidoretinopathies
- 4.3 Juvenile retinoschisis
- 4.4 Asteroid hyalosis
- 4.5 Cholesterosis
- 4.6 Vitreous haemorrhage
- 4.7 Blunt trauma and the vitreous
- 4.8 Inflammation and vitreous
- 4.9 Parasitic infestations
- 4.10 Pigment granules in vitreous
- 4.11 Vitreous complications in cataract surgery
- 4.12 Retinal vascular diseases
- 4.13 Diseases of choroidal vasculature, Bruch's membrane and retinal pigment epithelium
  - 4.13.1 Retinal tumours
  - 4.13.2 Retinoblastoma
  - 4.13.3 Phakomatoses
  - 4.13.4 Retinal vascular anomalies
  - 4.13.5 Retinal and optic nerve head astrocytomas
- 4.14 Other retinal disorders
- 4.15 Retinal inflammations
- 4.16 Metabolic diseases affecting the retina
- 4.17 Miscellaneous disorders
- 4.18 Electromagnetic radiation effects the retina
- 4.19 Retinal physiology and psychophysics

- 4.20 Hereditary macular disorders [Including albinism]
- 4.21 Peripheral retinal Degenerations
- 4.22 Retinal holes and detachments
- 4.23 Intraocular foreign bodies
- 4.24 Photocoagulation

## **UNIT-5: OTHERS**

- 5.1 Neuro ophthalmic examination
- 5.2 History
- 5.3 Visual function testing
- 5.4 Technique of pupillary examination
- 5.5 Ocular motility
- 5.6 Checklist for testing
- 5.7 Visual sensory system
- 5.8 The retina
- 5.9 The optic disc
- 5.10 The optic nerve
- 5.11 Optic chiasma
- 5.12 Optic tracts
- 5.13 Lateral geniculate body
- 5.14 Optic radiations
- 5.15 Visual cortex
- 5.16 Visual field
- 5.17 Blood supply of anterior and posterior visual systems
- 5.18 Disorders of visual integration
- 5.19 Ocular motor systems
  - 5.19.1 Saccadic system
  - 5.19.2 Clinical disorders of saccadic system
    - Gaze palsies
    - Progressive supranuclear palsy
    - Parkinson's diseases
    - Ocular motor apraxia
    - Ocular oscillation
  - 5.19.3 Smooth pursuit system and disorders
  - 5.19.4 Vergence system
  - 5.19.5 Cerebellar system
  - 5.19.6 Non visual reflex system
  - 5.19.7 Position maintenance system
  - 5.19.8 Nystagmus
  - 5.19.9 Ocular motor nerves and medial longitudinal fasciculus
- 5.20 The facial nerve
- 5.21 Pain and sensation from the eye
- 5.22 Autonomic nervous system

- 5.23 Selected systemic disorders with neuro ophthalmologic signs
- 5.24 An overview of glaucoma
- 5.25 Aqueous humour dynamics – gonioscopy
- 5.26 Intraocular pressure and tonometry
- 5.27 Evaluation of optic nerve head
- 5.28 Visual fields
- 5.29 Glaucoma screening
- 5.30 Classification of glaucoma
- 5.31 Primary open angle glaucoma
- 5.32 Primary angle closure glaucoma
- 5.33 Primary congenital glaucoma
- 5.34 Secondary glaucoma
- 5.35 Principles of medical therapy
- 5.36 Other modalities of glaucoma treatment
- 5.37 Definitions
  - 5.37.1 Causes
  - 5.37.2 Social implications
  - 5.37.3 Rationale in therapy
- 5.38 Drug induced ocular diseases
- 5.39 eye and systemic diseases
  - 5.39.1 arterial hypertension
  - 5.39.2 diabetica mellitus
  - 5.39.3 acquired heart diseases – embolism
  - 5.39.4 cancer – introduction
  - 5.39.5 connective tissue diseases
  - 5.39.6 thyroid disease
  - 5.39.7 tuberculosis
  - 5.39.8 helminthiasis
  - 5.39.9 common tropical medical ailments
  - 5.39.10 malnutrition
  - 5.39.11 introduction to immunology
  - 5.39.12 neurological disorders
  - 5.39.13 general medical emergencies – first aid
  - 5.39.14 genetics

## **PAPER – IV LOW VISION AIDS**

### **UNIT-1: IDENTIFYING THE LOW VISION PATIENTS**

- 1.1 History
- 1.2 Diagnostic procedures in low vision case management

### **UNIT-2: OPTICS OF LOW VISION AIDS**

- 2.1 Refraction, special charts, radical radiology
- 2.2 Evaluating near vision-amsler grid and field defects, prismatic scanning
- 2.3 Demonstrating aids-optical, non optical, electronic



### **UNIT-3: TEACHING THE PATIENT TO USE AIDS INCLUDING ECCENTRIC VIEWING TRAINING WHERE NECESSARY**

- 3.1Spectacle mounted telescopes and microscopes
- 3.2Guidelines to determine magnification and selecting low vision aids for
- 3.3Distance, intermediate and near

### **UNIT-4: CHILDREN WITH LOW VISION**

- 4.1Choice of tests, Aids in different pathological conditions
- 4.2 Light, glare and contract in low vision care and rehabilitation
- 4.3Bioptic telescope

### **UNIT-5: OPTICAL DEVICES TO HELP PEOPLE WITH FIELD DEFECTS**

- 5.1Contact lens combined system
- 5.2Rehabilitation of the visually handicapped

## **PAPER – V GERIATRIC OPTOMETRY & PEDIATRIC OPTOMETRY**

### **UNIT-1: HISTORY**

- 1.1Genetic factors
- 1.2Prenatal factors
- 1.3Perinatal factors
- 1.4Postnatal factors
  - Measurement of visual acuity
  - Normal Appearance, pathology and structural anomalies of
- 1.5Orbit
- 1.6Eyelids
- 1.7Lacrimal system
- 1.8Conjunctiva
- 1.9Cornea
- 1.10Sclera
- 1.11Anterior chamber, uveal tract, pupils
- 1.12Lens
- 1.13Vitreous, Funds
- 1.14Oculomotor system
- 1.15Measurement of refractive status
- 1.16Determining binocular status
- 1.17Determining sensory motor adptability

### **UNIT-2: COMPENSATORY TREATMENT AND REMEDIAL THERAPY FOR**

- 2.1Myopia
- 2.2Pseudo myopia
- 2.3Hyperopia
- 2.4Astigmatism
- 2.5Anisometropia
- 2.6Amblyopia

## **UNIT-3: REMEDIAL AND COMPENSATORY TREATMENT FOR STRABISMUS AND UYSTAGMUS**

3.1vergence and accommodation

### **GERIATRIC OPTOMETRY**

#### **UNIT-4: Structural changes in the eye**

4.1Physiological changes in the eye

4.2Optical and refractive changes in the eye

4.3Aphakia, psuedophakia-it's correction

4.4Ocular diseases common in old eye, with special refrence to cataract disorders, vascular diseases of the eye

#### **UNIT-5: Special considerations in ophthalmic dispensing to the elderly**

5.1Management of visual problems of aging

5.2How to carry on one's visual taks overcoming the problems of againg.

### **CLINICALS FOR SECOND AND THIRD YEAR**

1. Case sheet
2. History taking
3. Lensometry
4. External examination
5. Test for phorias and tropias
6. Visual acuity
7. Objective Refraction
8. Subjective Refraction
9. Keratometry
10. Slit lamp examination [Applanation tonometry]
11. Drugs and method of application
12. Do's and Don't's – papillary dilatation
13. Direct ophthalmoscopes
14. Indirect ophthalmoscopes

### **FOR CONTACT LENS PATIENTS**

15. Patient selection [Type of Contact lens]
16. Perform the procedures up to 10[avoiding applanation tonometry]

### **PROCEDURES FOR SOFT LENS**

17. Fitting of trial based on the refractive correction & keratiometry
18. Slit lamp examination to assess the fitting of CL
19. Perform over refraction
20. Prescribe the final basecurve & power of CL

## **PROCEDURES FOR RGP LENS**

21. Fitting of trial lens based on the refractive correction & keratometry
22. Evaluate the fluoresce in pattern under the slit lamp to finalise the base curve of the CL
23. Select the trial lens with the final base curve & required power
24. Perform over refraction
25. Prescribe the final Base curve & power of contact lens

## **LIST OF REFRACTION BOOKS FOR B.Sc., OPTOMETRY**

### **SQUNIT AND BINOCULAR VISION**

1. Binocular vision and Ocular motility Von Noorden
2. Clinical management of binocular vision M.Scheimann, Bruce Wick

### **CONTACT LENS**

1. Contact Lens Anatomy.J.Philips,,Janet, Stone
2. Text book of Contact Lens V.K.Dada
3. Contact Lens practice Reben & Guillon
4. Contact Lenses-  
Science and clinical practice The CLAO guide to basic  
Pater.R.Kastl

### **OCULAR DISEASES**

1. Clinical ophthalmology –A systemic approach Jack.J.Kanski
2. Text book op Ophthalmology A.K.Khurana
3. Person's Diseases of the eye Resived by Ramanjith Sihote  
Radhika Tandon

### **LOW VISION AIDS**

1. Low vision care E.B.Mehr,Allen.N.Fried
2. Clinical Low vision Eieanor.E.Faye

### **GERIATRIC OPTOMETRY**

1. Vision of the Ageing patient Hirsch Wick
2. Vision of the Ageing  
General and Clinical Perspectives Alfred Rosenbloom  
Meredith.W.Morgan

### **PEDIATRIC OPTOMETRY**

1. Principles and Practice of pediatric  
Optometry Alfred Rosenbloom, Meredith,W.Morgan
2. Pediatric Optometry Jerome Rosner
3. Clinical Pediatric Optometry Leonard.J.Press, Bruce.D.Morre

### **COMMUNITY OPTOMETRY**

1. Public health and Community Optometry Robert.D.Nwecomb,  
Jerry.L.Jolley