

**Bharati Vidyapeeth
Deemed University
Medical College
School of Optometry**

**Details of Teaching Syllabus
Bachelor of Clinical Optometry**

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Syllabus topics for Bachelor in Clinical Optometry

First Year Term One Schedule

Topic Code	Lectures by	Number of hours	
		Lectures	Practical
T101	Human Biology Medical faculty	75	
T102	Basic Biochemistry Medical faculty	50	
T103	Physical Optics & Lighting Physics faculty	75	
T104	Geometrical Optics Optometric + Physics faculty	75	30
T105	Dispensing Optics Optometric faculty	125	120
Total hours of teaching		400	150

Pattern of Examination at end of First Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing marks
P 1	Human Biology	= T101 + T102	100	50
P 2	Basic Optics	= T103 + T104	100	50
P 3	Dispensing Optics	= T105	100	50
Viva 1	Clinical	= T101+ T102	100	50
Viva 2	Technical	= T103 + T104 + T105	100	50
Total marks Examination			500	250

First Year Term Two

Topic Code	Lectures by	Number of hours	
		Lectures	Practical
T201	Eye Anatomy & Physiology Medical faculty	200	25
T202	Basic & Ocular Pharmacology Medical faculty	50	
T203	Pathology and Microbiology Medical faculty	50	
T204	Ophthalmic Optics Optometric faculty	75	125
T205	Computer Fundamentals Computer Department	25	
Total hours of teaching		400	150

Pattern of Examination at end of Second Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing marks
P 1	Eye Anatomy & Physiology	= T201	100	50
P 2	Related Sciences	= T202 + T203	100	50
P 3	Ophthalmic Optics	= T204	100	50
V 1	Clinical	= T201+ T202 + T203	100	50
V 2	Technical	= T204	100	50
Total marks Examination			500	250

Second Year Term Three

Topic Code	Lectures by	Number of hours	
		Lectures	Practical
T301 Visual Optics	Optometric faculty	100	30
T302 Dispensing Optics	Optometric faculty	100	90
T303 Optometric Instruments	Optometric faculty	75	30
T304 Clinical Examination of Eye	Ophthalmic faculty	75	30
T305 Ocular Diseases (I)	Ophthalmic faculty	50	
Total hours of teaching		400	180

Pattern of Examination at end of Third Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing marks
P 1	Visual Optics	= T301	100	50
P 2	Dispensing Optics	= T302	100	50
P 3	Eye Checkup & instruments	= T303 + T304 + T 305	100	50
Viva 1	Clinical	= T303 + T304 + T 305	100	50
Viva 2	Technical	= T301 + T 302	100	50
Total marks Examination			500	250

Second Year Term Four

Topic Code	Lectures by	Number of hours	
		Lectures	Practical
T401 Optics & Refraction	Optometric faculty	100	45
T402 Optometric Optics & LVA	Optometric faculty	75	45
T403 Ocular diseases (II)	Ophthalmic faculty	75	30
T404 Optometric investigations	Optometric faculty	100	60
T405 Hospital procedures & Medical Psychology	Medical faculty	50	
Total hours of teaching		400	180

Pattern of Examination at end of Fourth Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing marks
P 1	Optics & Refraction	= T401	100	50
P 2	Optometric Optics & LVA	= T402	100	50
P 3	Eye investigations & disease	= T403 + T404 + T405	100	50
Viva 1	Clinical	= T403 + T404	100	50
Viva 2	Technical	= T401+ T402	100	50
Total marks Examination			500	250

Third Year Term Five

Topic Code	Lectures by	Number of hours	
		Lectures	Clinics
T501	Contact Lenses (I) Optometric faculty	100	90
T502	Binocular Vision & Ocular motility Optometric faculty	100	90
T503	Systemic diseases and the eye Ophthalmic faculty	30	
T504	Major Eye diseases Ophthalmic faculty	30	90
T505	Nutrition Medical faculty	20	
T506	Public health & Com. Optometry Optometric faculty	20	30
Total hours of teaching		300	300

Pattern of Examination at end of Fifth Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing marks
P 1	Contact Lenses	= T501	100	50
P 2	Binocular Vision	= T502	100	50
P 3	Diseases & Optometry	= T503+T504+T505+T506	100	50
Viva 1	Clinical	= T503+T504+T505+T506	100	50
Viva 2	Technical	= T501 + T502	100	50
Total marks Examination			500	250

Third Year Term Six

Topic Code	Lectures by	Number of hours	
		Lectures	Practical
T601	Contact Lenses (II) Optometric faculty	100	90
T602	Advanced Orthoptics Optometric faculty	75	90
T603	Applied & Clinical Optometry Optometric faculty	75	120
T604	Optometry & Law in India Optometric faculty	25	
T605	Basic Accountancy & Public relations Management faculty	25	
Total hours of teaching		300	300

Pattern of Examination at end of Sixth Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing marks
P 1	Contact Lenses	= T601	100	50
P 2	Advanced Orthoptics	= T602	100	50
P 3	Applied, Clinical Optometry	= T603 + T604	100	50
Viva 1	Clinical	= T601 + T602	100	50
Viva 2	Technical	= T603 + T604	100	50
Total marks Examination			500	250

Fourth Year [Internship]

In specialty clinics & Optical establishments

Phase I

Phase II

Phase III

Phase IV

Clinical Examination (Viva + Practical)

Clinical Optometry

Investigative Optometry

Dispensing Optics &
Workshop Practice

BACHELOR OF CLINICAL OPTOMETRY SYLLABUS

First Year Term One

T101 HUMAN BIOLOGY

- 1) **Scope and Objective** = Anatomy, histology, and Physiology are introduced by terms and elementary principles based upon simple biology. Knowledge of normal physiology is the necessary pre-requisite to understand the abnormal state of functions of organs in diseases. The course aims at imparting to the students the basic structure & functioning of the human body, adequate enough to equip them to better understanding of other subjects like General and Ocular Biochemistry, Pathology, Microbiology, Neuro-Ophthalmic investigations, Systemic diseases and the eye.

Lectures should be designed keeping in mind a balanced presentation of the unified working of the body system with special examples taken from departures from normal health. Ocular example should be used as and when appropriate.

The scope of the course is in keeping with the limited objectives of the knowledge and skill expected of a graduate in Optometry. At the end of the course, the student is expected to be able to describe the salient features of the tissues of the body, the topography of the constituents of the organ systems, their structural relationships and basic functions.

- 2) **Text and reference Books** =
 - a) Textbook of Anatomy and Physiology – Catherine Parker Anthony, Gary A. Thibodeau, C.V. Mosby Company.
 - b) Principles of Anatomy and Physiology 6th, 7th editions – G.J. Tortora & N.P. Anagnostakos.
 - c) Handbook of General Anatomy, 2nd Ed. B.D. CHAURASIA, CBS Publishers and Distributors, New Delhi 110032.

Lecture & Demonstration Topics

1. Organisation of the body
Basic Chemistry and some facts about biochemistry – definitions, atoms, Biomolecules, Bioenergy, Biosynthesis.
2. Generalisations about body structure, terms used in describing body structure, Definitions and Terminology in Human Biology, Anatomy, Histology, etc.
3. Classification of body system and tissues, Directional terms, Planes of body, abdominal regions, anatomical positions.
4. Generalisations about body functions, Homeostasis of body temperature.
5. Cell structure – Cell differences, cell membranes, Protoplasm, Cytoplasm, organelles, Nucleus and special cell structures.

6. Cell Physiology – movement of substances through cell membranes, types of processes – Diffusion, Osmosis, Filtration, Physiological pumps, Phagocytosis and pinocytosis.
7. Tissues – Epithelial, Locations, functions, types and generalisations.
Connective tissue – types, functions and characteristics; Muscle and Nervous tissues.
8. Membranes and glands – Definitions and types, mucous membranes, serous and cutaneous membranes; Skin – epidermis, dermis and accessory organs.
9. Glands – Composition and types.
10. Skeletal System – Bones and cartilage – Types and Functions, description of major bones in skull specially near the orbit, formation and growth of bone, divisions of skeleton, age changes in skeleton.
11. Skeletal system – Articulations – meaning and functions, kinds of joints, joint age changes and diseases.
12. Skeletal system – Muscles – general functions, skeletal muscles organs, weak places in abdominal wall, posture- meaning, how maintained, importance of body as whole.
13. Nervous system – Cells and nerve impulse conduction, definitions and various mechanisms.
14. Somatic nervous system – divisions of nervous system, brain and spinal cord, divisions and size and parts of brain, brain stem – structure, functions; Sleep, consciousness, memory.
15. Cranial nerves – structure and functions.
16. Somatic sensory and motor pathways. Reflexes – definitions and some somatic reflexes of clinical importance.
17. Autonomic nervous system – definitions, structure, general principles and functions.
18. ANS as a whole, Sympathetic and Parasympathetic divisions – functions, especially ocular.
19. Sense organs – Classifications, structure and functions, types of pain.
20. Eye, Auditory apparatus, olfactory sense organs, gustatory sense organs.
21. Endocrine system – meaning, prostaglandins (tissue hormones), how hormones act.
22. Pituitary gland – size location, component glands,
23. Thyroid gland – location, structure, hormone and effects.
24. Parathyroid – location, structure, hormone and effects.
25. Adrenal glands – location structure, hormones and effects.
26. Islands of Langerhans – insulin, glucagon, pancreatic polypeptide.
27. Ovaries – Estrogen and progesterone, Testes – Testosterone.
28. Pineal gland and Thymus – brief description and significance.
29. Blood – Volume, component cells – structure and functions, formation and life span, blood groups, plasma and coagulation – purpose, mechanism, factors affecting blood clotting.
30. Anatomy of cardio-vascular system – Heart – Location, size, structure and functions, conduction system, ECG, control of heart rate, cardiac cycle.
31. Blood vessels – kinds, structure, functions, main blood vessels.
32. Blood circulation – definitions, control of arterial blood pressure.
33. Blood circulation – how to trace – methods of study and clinical importance - especially retinal circulation.
34. Blood pressure – clinical methods of measurement, significance in ocular diseases.
35. Pulse – definition, cause, feeling the pulse, measurement and clinical significance.
36. Lymphatic system – definitions, lymph and tissue fluid, lymphatics – formation and distribution, structure and functions, Lymph nodes – structure, locations and functions.
37. Thymus and Spleen – location, structure and functions.

38. Respiratory system – general outline of structure and functions of Nose, Pharynx, Larynx, Trachea, Bronchi, Lungs.
39. Physiology of respiration – pulmonary ventilation, volumes of air exchanged, types of breathing, external and internal respiration, Exchange of gases for Cornea even under closed eye conditions.
40. Digestive system – general outline of Structure, functions of buccal cavity, salivary glands, teeth, Pharynx, esophagus, stomach, small intestine, large intestine, peritoneum, Liver, Gallbladder, Pancreas.
41. Definition of digestion, purpose mechanical and chemical digestion; Absorption – definition and how accomplished.
42. Metabolism – Important generalisations – Outline of Carbohydrate, fat, protein metabolism.
43. Homeostasis of body temperature – Heat production and loss, heat dissipating and gaining mechanisms, control of body temperature and fever.
44. Urinary system – Kidneys – Size, shape, location, outline of structure, functions, influence on blood pressure.
45. Urinary system – Ureters, Bladder, Urethra - Outline of structure, location and functions.
46. Urine – Physical Characteristics, chemical composition, definitions, routine tests.
47. Fluid and electrolyte balance – general principles about fluid balance. Mechanisms that maintain homeostasis of fluid and electrolyte distribution, Significance of fluid and electrolyte balance in human crystalline lens and cornea - causes of opacities (Cataract).
48. Acid–Base balance – mechanisms that control pH of body fluids – meaning of pH and range of pH values – significance of tear pH and insertion of Contact Lenses, eye medications.
49. Reproduction of cells – Deoxyribonucleic acid (DNA), Mitosis, meiosis, Spermatogenesis, Oogenesis.
50. Male reproductive system – general outline of structures involved.
51. Female reproductive system – general outline of main and accessory structures involved. Recurring cycles Ovation, menstruation – regulations, clinical significance, effect on Cornea. - Pregnancy and birth - breast - family planning.
52. Sexual reproduction – meiosis.
53. Genes chromosomes, Inheritance and human variations.
54. Mutations, Autosomal and sex linked inheritance.
55. Intelligence and human society.
56. Embryology – Meaning, steps in development of new individual.
57. Survey of embryology, Features of the embryo – age and length relationships.
58. General functioning of normal human body, age related changes.
59. Immune system – Major components – Lymphocytes, antibodies (immunoglobulins), complement, properdin, interferon, conditions involving abnormalities of immune system, Transplant rejection, - Corneal transplant, etc. Major diseases - Cancer, AIDS.
60. Stress – definitions, development concept, mechanisms, stress and disease.
61. Stress syndrome, indicators of stress, Psychological stress.
62. Outline of the pathological processes -Inflammation, infection, edema, disease, Ulcer.

T102 BASIC BIOCHEMISTRY

- 1) **Scope and Objective** = Bodily function relies upon chemistry; thus the basic laws of biochemistry form a vital introduction. The course aims at making the students learn the basic Biochemistry with emphasis on fundamentals. It includes topics on organic aspects of Carbohydrates, Proteins, Lipids and Nucleo-proteins, Enzymatology, Vitamins and minerals and Hormones.

Students will learn the main aspects of metabolism of major biochemicals in the body i.e. carbohydrates, proteins and lipids. For example, Tear proteins get deposited on the Contact lenses, causing many problems. The tear liquid has normal properties, which get modified by the use of contact lens liquids. Being students of Optometry, they would learn the basic facts in ocular structures and their functions as also clinical Biochemistry with reference to analysis of glucose urea, creatinine and bilirubin in blood. They would also learn the physico-chemical aspects of Biochemistry.

- 2) **Text and Reference Books** =
- a) Biochemistry of the eye 2nd edition – Whikehart, Butterworth Heinemann
 - b) Essentials of Biochemistry and Ocular Biochemistry, S. Ramkrishnan 1992, Publications Division, Annamalai University. (EBO).

Lecture Topics

1. Hormones basic concepts in metabolic regulation with examples, insulin.
2. Metabolism - General whole body metabolism (Carbohydrates, proteins, and lipids).
3. Carbohydrates - Properties & tests for Glucose; fructose; galactose; lactose; sucrose; starch and glycogen.
4. Proteins - Properties & tests for Amino acids, peptides, and proteins (general with a few important examples like glycine, tryptophan, glutathion, albumin).
5. Lipids - Properties & tests for General with important examples like cholesterol, phospholipids, fatty acids, etc.
6. Enzymes - Properties & tests for Properties, functions, co-enzymes, cofactor, apoenzyme, holo enzyme with examples like trypsin, pepsin, etc.
7. Vitamins - Properties & tests for General with emphasis on A, B2, C, E and Inositol.
8. Minerals - Properties & tests for Na, k, Ca, P, Fe and Se.
9. Techniques - Colloidal state, sol, gel, emulsion, dialysis, electrophoresis; pH buffers, mode of buffer action, molar and percentage solutions, photometry, colorimetry and spectrophotometry.
10. Clinical Biochemistry - Blood sugar, urea, creatinine and bilirubin significance of their estimation.
11. Ocular Biochemistry - Various aspects of the eye, viz., Tears, Cornea, Lens, Aqueous, Vitreous, Retina and pigment Rhodopsin. (The important chemicals in each and their roles).

T103 PHYSICAL OPTICS AND PRINCIPLES OF LIGHTING

- 1) **Scope and Objective** = The Optometric students are to understand the nature and importance of light which is essential for the human to 'see'. The electrical artificial light sources and light measurement are also covered. The aim of this course is to give the student the fundamentals of wave theory of light and consequences of wave aspects like interference, diffraction and polarisation. Various optical instruments used to study the wave aspects of light are also discussed in this course. A Unified approach to theory and experiments will be presented.
- 2) **Text and reference Books** =
 - a) Geometrical, Physical and Visual Optics – Micheale Keating Butterworth Heinemann.
 - b) A Textbook of Optics N. SUBRAMANYAM & BRIJ LAL.
 - c) Fundamentals of Optics : F.A. JENKINS & H.E. WHITE.

Lecture Topics for Physical Optics

- 1) NATURE OF LIGHT :
 - a) Wave nature of light - short comings of wave theory.
 - b) Quantum theory - dual nature of light.
 - c) Mathematical representation of wave – S.H.M. Energy composition of S.H.M. in a straight line and at right angles.
 - d) Hugen's Principle - Laws of reflection and refraction at spherical surfaces and lenses.
 - e) The paraxial region.
 - f) Ray and wave velocity.
- 2) INTERFERENCE :
 - a) Description of the phenomena - Young's experiments, coherent sources, phase and path difference, and intensity. Theory of interference fringes.
 - b) Interference in thin films - interference due to reflected and transmitted light - Lloyd's single mirror.
 - c) Colours of thin films - wedge shaped thin films - testing of plainness of surface.
 - d) Newton's rings experiment - refractive index of liquid.
 - e) Non-reflecting films.
 - f) Visibility of fringes.
3. DIFFRACTION :
 - a) Single slit, qualitative and quantitative.
 - b) Circular aperture.
 - c) Double slit pattern.
 - d) Multiple slits - grating.
 - e) Reflection grating and the zone plate.
4. POLARISATION :
 - a) Polarization of transverse waves - light as transverse waves.
 - b) Double refraction, principal plane, Nicol prism - plane polarisation.
 - c) Circular, elliptic polarisation production, detection and behaviour.

- d) Optical activity - Fresnel's half shade polarimeter.
- e) Polarisation by selective absorption - dichorism.
- f) Basic principles of Holography.

5. SPECTRUM :

- a) Sources of spectrum, Bunsen - carbon - mercury - sodium.
- b) Emission and absorption spectra - classification - visible - ultra violet and infra red spectra - electromagnetic spectrum.

6. SCATTERING :

- a) Rayleigh's scattering.
- b) Raman scattering.

7. Surface tension

8. Viscosity.

Lecture Topics for Principles of Lighting

1. Visual Tasks = Factors affecting Visual tasks.
2. Modern theory on light and colour : synthesis of light.
3. Additive and subtractive synthesis of colour.
4. Light sources = Modern light sources, spectral energy, distribution, luminous efficiency, colour temperature, colour rendering.
5. Illumination = Luminous flux, candela, solid angle.
6. Illumination = Utilisation factor, depreciation factor.
7. Illumination laws.
8. Lighting installation = glare, luminaries, lighting fixtures, types of lighting.
9. Requirements for illuminations of workplace.
10. Typical lighting installations
11. Specialized aspects of illumination, endoscopes, headlamps, etc,
12. Photometry = measurement of illumination, photometers and filters.
13. Eye care and lighting – special care.

PHYSICAL OPTICS

PRACTICAL

1. Determination of cardinal points of lens systems.
2. Fresnel's biprism experiment.
3. Grating - wavelength determination.
4. Newton's Rings - radius of curvature, Newton's Rings - refractive index of a liquid.
5. Reflection grating.
6. Resolving power of a telescope.
7. Spectroscope, determination of refractive index of prism.
8. Thickness of thin glass plate.
9. Use of telescopes in small observatory.

T104 GEOMETRICAL OPTICS

1. **Scope and Objective** = The Geometric Optics is the basis for clinical refraction and to study the eye. It also forms the basis for Geometrical Optics of the eye. The derivation of various formulae for refraction in spherical surfaces and lens is discussed.
2. **Text and reference Books** =
 - a. Geometrical, Physical and Visual Optics – Micheale Keating Butterworth Heinemann.
 - b. A Text Book of Optics : N. Subramaniam & Brij Lal.
 - c. Fundamentals of Optics : F. A. Jenkins & H. E. White.
 - d. Physics for Ophthalmologist – Douglas J Coster

Lecture Topics

1. Photometry
 - a) Basic concepts and definitions in Photometry.
 - b) Reflection co-efficient, transmission co-efficient, powers - transmitted and reflected - Lumen Bodhun photometer.
2. Refraction Through Spherical Surfaces :
 - a) Introduction - Lens shapes, vergences and conversion factors. Divergence and convergence of wave fronts by spherical surfaces. How spherical lenses work - primary and secondary focal points - predictable rays.
 - b) Spherical refracting interfaces - convex, concave, derivation of vergence equation, sagittas, dioptric power - focal points, nodal points and plane. Symmetry points, imaging examples, lateral magnification.
 - c) Thin lens equation - lenses in contact separated. Two lens systems - reduced system - vergence effectivity equation.
 - d) Application - calculation of image points, dioptric powers in reduced systems using vergence techniques.
 - e) Thick lenses - front and back vertex powers - reduced system - dioptric power of equivalent lenses, cardinal points. Application - to calculate 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.
3. Aberrations :
 - a) Chromatic aberrations - dispersion without deviation and deviation without dispersion.
 - b) Dispersion by a prism - angular dispersion - dispersive power - dispersion without deviation and deviation without dispersion. Achromatic prism and lenses - prism diopters.
 - c) Monochromatic aberrations - first order and third order theory.
 - d) Spherical aberrations, coma, astigmatism, curvature, distortion - causes and the methods of minimising aberrations.
 - e) Tangent condition for elimination of distortion.
4. Fiber optics – introduction and uses, general applications in Ophthalmic & Optical industry.
5. Colour theories - trichromatic colour measurement.

6. Optical instruments - spectrometer - simple and compound microscope - telescope - Fresnel's biprism - Resolving power of optical instruments - Dispersive power - magnifying power of simple and compound microscope, telescope.
7. Application of vergence technique to calculate dioptric powers, separation distances in microscopes and telescopes.

Geometrical Optics Lectures by Physics faculty.

1. Rectilinear propagation, Shadows, Huygen's principle.
2. Reflection at plane mirrors, Multiple reflections.
3. Refraction, refractive index, velocity of light.
4. Vergence. Power of single surface. Ray tracing.
5. Thin lens Image formation Conjugate foci.
6. Lens aberrations – general.
7. Lens aberrations – correction.
8. Astigmatic pencils.
9. Chromatic aberrations of lenses and its correction.
10. Total internal reflection prism deviation.
11. Minimum and maximum deviation - achromatic prisms.
12. Spherical, Cylindrical and toric surfaces.
13. Aspheric surfaces and lenses.
14. Coaxial systems of spherical surfaces, Reduced vergence.
15. Coaxial systems of thin lenses.
16. Stops and apertures in lens systems.
17. Thick lenses and lens systems.
18. Thick lenses – advanced.
19. Dispersion Spectra.
20. Magnification and magnifiers.
21. Microscopes introductory.
22. Microscope design.
23. Telescopes – History and principles.
24. Telescopes – Designs and uses.
25. Holograms.

GEOMETRIC OPTICS

PRACTICAL

1. Refraction through a slab and a curved surface.
2. Spherometer and lens gauge.
3. Surface power, Spherometer and ray tracing.
4. Apparent depth method for refractive index.
5. Critical angle - glasses and water.
6. Prism deviation and internal reflection.
7. Dispersion of prisms.
8. Lens system, effects of separations.
9. Chromatic aberrations of simple lens.
10. Magnifiers- measurements of effects.
11. Magnifying power of a simple and a compound microscope, telescope.
12. Microscope systems.

T105 DISPENSING OPTICS

1. **Scope and Objective** = Imparting the knowledge about surfacing and polishing, spherical, sphero-cylindrical and bifocal spectacle lenses. To cut finished lenses according to various frame shapes and sizes and fit them in to frames after glazing. Make them capable of assessing facial and frame shape and size. They are taught to evaluate all parameters, which are essential for an ideal spectacle fit. To check any defects in a finished lens before dispensing the lenses to a patient.
2. **Text and reference Books** =
 1. Ophthalmic Prescription Work : 2nd Edition, A.G.Bennet Simon J.L. Blumlein.
 2. Ophthalmic Dispensing and Workshop Practice : W.S. Topliss.
 3. System of Ophthalmic dispensing : Clifford W. Brooks & Irvin M. Borish.
 4. Spectacle Lenses – Theory and practice – Coling Fowler, Butterworth Heinemann.
 5. Ophthalmic Lenses and dispensing - M. Jalie, Butterworth Heinemann.
 6. Spectacle Lenses - Theory & Practice – Colin Fowler, Keziah Latham
 7. Ophthalmic Lenses and Dispensing – M Jalie

Lecture Topics

Ophthalmic Lenses Theory Basics (I)

1. Introduction – Light, mirror, reflection, refraction & absorption.
2. Definitions – Prisms, Lenses, Frames, Spectacles.
3. Prisms – definition, Properties, Refraction through prisms, units.
4. Prisms –Uses of prisms, Nomenclature prisms.
5. Thickness difference and base - apex notation.
6. Sign Conventions.
7. Lenses – Definition, Terminology used to describe lenses.
8. Form of Lenses – Convex lenses & Concave lenses.
9. Refraction & image formation through convex and concave lenses.
10. Determination of focal length and dioptric power of lens.
11. Surface power and radius/ refractive index values.
12. Vertex distance and vertex power.
13. Effectivity and effective powers.
14. Lens shape, size, Types i.e. Spherical, Cylindrical, Sphero- cylindrical.
15. Toric surfaces and their significance, Toric lenses.
16. Sturm's conoid.
17. Neutralization of lenses.
18. Spherometer & sag formula.
19. Focimeter – power of lens & prisms.
20. Center marking & Axis marking by focimeter.
21. Simple Transposition.
22. Toric transposition.
23. Prismatic effect, Centeration, decentration, Prentice's rule.
24. Prismatic effect of sphero-cylinders and Plano cylinders.
25. **Differential prismatic effects.**
26. Decentration of lenses and edge thickness.
27. Decentration – examples.

28. Components and interpretation of spectacle prescription.
29. Prescription mistakes commonly made.
30. Prismatic effect of sphero-cylindrical lenses.
31. Aberrations in Ophthalmic lenses.
32. Tilt induced power in spectacle lenses.
33. Magnification in high plus lenses.
34. Minification in high minus lenses.

Ophthalmic Lenses Types, Manufacturing, Workshop Practice

1. Prescription laboratory in action.
2. Instruments for making lenses.
3. Outline of lens surfacing and polishing.
4. Recording and ordering of Ophthalmic lenses.
5. Terminology used in Lens workshops.
6. Ophthalmic raw materials – history and general outline.
7. Manufacturing of Ophthalmic blanks – Glass.
8. Glass lenses – material types and characteristics.
9. Glass working – spherical surfaces.
10. Glass working – Toric and Aspherical.
11. ISI Standards for lenses.
12. Ophthalmic lens designs – best form lenses.
13. Design of high powered lenses.
14. Bifocal design and manufacture.
15. Faults in lenses – description.
16. Faults in lenses – detection.

Spectacle Frames – theory basics (I)

1. History of spectacles.
2. Nomenclature and terminology.
3. Types and Parts of spectacle frames.
4. Spectacle frames - sides and joints.
5. Spectacle Frame Bridge.
6. Shapes of spectacle frames – advantages and disadvantages.
7. Spectacle frame measurements and markings – Datum & Boxing system

First Year Term Two

T201 EYE ANATOMY & PHYSIOLOGY

- 1) **Scope and Objective** = A thorough understanding of the anatomical structure and functions of the eye. It should also include effects of the cranial nerves, sympathetic and para-sympathetic nervous systems on the eye. At the end of this course, the student should be able to describe the silent features of the structure of the eye and its adnexa, related nervous system and correlate these with the functions of the whole body.

The study of ocular physiology is basic and fundamental in Optometric curriculum. The object of the course is to make the students understand thoroughly the functional mechanisms of visual apparatus.

Text and reference Books

1. Physiology of the eye - Adler H - 4th edition 1980
2. Functional Anatomy and Histology of Eye – Gordon Ruskell, Butterworth Heinemann.
3. Ocular Anatomy – Arvind Eye Hospital, Madurai.
4. Diagnosis of Defective colour vision – Jennie Birch
5. Clinical Anatomy of Visual system – Lee Ann Remington, Butterworth Heinemann.
6. Clinical Ocular Physiology – Nagi Hang Victor Chong, Butterworth Heinemann.

Lecture Topics

By Ophthalmologist faculty *recommended to be covered in 125 lectures.*

1. Outline of Visual system - overall view.
2. Anatomical parts – terminology, anterior and posterior segments and chambers.
3. Adnexa and the orbit – constituent bones – properties, functions.
4. Orbital openings, contents and their relationships.
5. Three coats of the eyeball – Outer, Middle, Inner.
6. Conjunctiva – regions, layers, functions, significance.
7. Sclera – regions, layers, functions, significance.
8. Cornea – regions, layers, functions, significance.
9. Corneal metabolism and transparency.
10. Limbus – regions, layers, functions, significance.
11. Middle coat – Uvea - Choroid, Iris, Pupil.
12. Choroid – regions, layers, functions, significance.
13. Ciliary body, ciliary muscles, processes – layers, functions, significance.
14. Iris – regions, structure, functions, significance and variations of colour.
15. Pupil – pupillary actions, reflexes to light – significance in sleep, coma.
16. Anterior chamber – structure, depth significance, Anterior chamber angle – regions.
17. Aqueous humor – secretion, normal composition, drainage.
18. Intra-Ocular-Pressure – significance, normal features, age variations.
19. IOP – methods of measurements – outline and significance.
20. Crystalline Lens – structure, growth, function, significance.
21. Lens metabolism – ageing process and lenticular sclerosis.
22. Posterior chamber – contents, significance.
23. Vitreous humor – composition, anatomical relevance, function.

24. Retina - anatomical structure, layers – significance, distribution of rods and cones.
25. Different regions of retina and Retinal representation in the brain.
26. Rhodopsin Cycle and retinal metabolism – outline.
27. Retinal functions, the Electro-Retino-Gram (ERG) significance.
28. Blood supply to all parts of eye and adnexa.
29. Cranial nerve supply to the eye.
30. Motor nerves to the eye and adnexa.
31. Visual pathway – complete structure, significance.
32. Optic tract, Optic chiasma, Lateral geniculate body, Optic radiations, Area 17.
33. Visual pathway, central and cerebral connections, lesions of pathway and effects.
34. Lesions of the pupillary pathways.
35. Ocular embryology – general outline.
36. Time relationships in ocular embryology – review.
37. Common congenital abnormalities of the eye – factors responsible.
38. Post-natal growth of the eye.
39. Growth phenomena in general, bodily growth reflected in the eye.
40. Eye in old age – Physiological changes.

Lecture Topics

By Optometrist faculty

recommended to be covered in 75 lectures.

1. Outline and review of Ocular structures and functions.
2. Visual system as a whole – significance.
3. Vision - general aspects of sensation.
4. Visual acuity, Visual perception - Binocular vision, stereoscopic vision, optical illusions.
5. Dark and light adaptation – significance and tests involved.
6. Colour Vision - theories, defects – methods of measurement and classification.
7. Visual Field – definition, significance, methods of examination – outline.
8. Visual field defects – types, description, significance.
9. Protective mechanisms in the eye.
10. Palpebral aperture, Eyelids – structure, functions.
11. Protective actions of the eyelids – blinking.
12. Lacrimal system – apparatus – secretion and drainage systems.
13. Tear Film – layers, functions, significance.
14. Muscles of eye – Extra Ocular and Intra Ocular.
15. Intra-Ocular-Muscles of the eye – Ciliary muscles and muscles of Iris.
16. Near Vision reflexes – accommodation, convergence, pupillary constriction.
17. The pupil reaction to near vision.
18. The pupil reflexes – light reactions.
19. Accommodation. – definition, classification.
20. Process and stimulus of accommodation.
21. Convergence – definitions, types.
22. Process and stimulus of convergence.
23. Extra-Ocular-Muscles – rectii, obliques, LPS.
24. EOM – anatomical structure, location, size, actions of individual muscles and movements of eyeball.
25. Eye as a refracting apparatus - Emmetropia and Ametropia, – definitions and outline only.

Practical and Demonstration sessions

- Eye : Practical dissection of bull's OR goat's eye.
Orbit : Practical demonstration of orbital structure.

T202 BASIC & OCULAR PHARMACOLOGY

1. **Scope and Objective** = Pharmacology is the basis of Therapeutics. The students are taught actions, uses adverse effects and mode of administration of drugs for various diseases.
2. **Text and reference Books** =
 - a) Ocular Pharmacology & Therapeutics, Arvind Eye Hospital, Madurai.
 - b) Ocular Pharmacology & Therapeutics – Micheal Doughty, Butterworth Heinemann.
 - c) The Actions and uses of Ophthalmic Drugs 3rd edition – Cornor Davies Hopkins & Pearson (Jaypee)
 - e. O'Connor Davies' Ophthalmic Drugs – 4th Edition – Hopkins, Pearson
 - f. Drugs, Medications & Eye – Michael Doughty
 - g. Clinical Ocular Pharmacology – 4th edition – Bartlett, Jaanus, Butterworth Heinemann.

Lecture Topics

1. GENERAL PHARMACOLOGY :
 - a) Mechanisms of drug action.
 - b) Dose- response relationships
 - c) Pharmacokinetics of drug absorption, distribution, bio-transformation, excretion and toxicity.
 - e) Factors influencing drug metabolism or drug action.
2. ACTION OF SPECIFIC AGENTS :
 - a) Depressants
 - b) Anti-coagulants
 - c) C.N.S. stimulants and antidepressants
 - d) Diuretics and hypertensive agents
 - e) Cardiovascular drugs
 - f) Histamines and antihistamines
 - g) Serotonin
 - h) Prostaglandins
3. PRINCIPLES OF OCULAR PHARMACOLOGY
 - a) Preparation and packaging of ophthalmic drugs.
 - b) General principles of ocular pharmacology.
 - 1) Drug actions and effectiveness.
 - 2) Drug safety.
 - 3) Factors influencing the objectively demonstrated response.
 - 4) Ocular penetration.
 - 5) Routes of general and ocular drug administration.
4. OPTOMETRIC DIAGNOSTIC DRUGS :
 - a) Optometric use of pharmaceuticals
 - 1) Classification of drug use.
 - 2) Topical ophthalmic drugs

- 3) References and drug indices
 - 4) Hazards of ophthalmic drugs
 - 5) Surface active drugs
 - 6) Topical anesthetics
- b) Principles and classification of autonomic drugs
- 1) Sympathomimetics
 - 2) Sympatholytics
 - 3) Parasympathomimetics
 - 4) Parasympatholytics
 - 5) Diagnostic use of autonomic drugs.
- c) Other drugs of Optometric interest
- 1) Physical agents
 - 2) Germicides and sterilizing agents
 - 3) Over-the-counter drugs
 - 4) Dyes and stains
5. OPHTHALMOLOGICAL DRUG USE :
- a) Anti-glaucoma drugs
 - 1) Drugs for ocular hypertension.
 - 2) Drugs that enhance aqueous outflow.
 - 3) Inhibitors of aqueous secretion.
 - b) Sulfonamides
 - c) Antibiotics
 - d) Corticosteroids
 - e) Anaesthetics.
 - f) Proteolytic enzymes.

T203 PATHOLOGY AND MICROBIOLOGY

Pathology

1. **Scope and Objective** = The object of the course is to prepare the students to be aware of the pathogenetic organism, aetiological causes and the changes seen in the tissues and particularly in the eye chamber. It also helps them to educate the public in prevention of blindness by adapting hygienic methods.
2. **Text and reference Books**
 - a. Pathological Basis of the diseases - ROBINS & KUMAR : 4th Edn.
 - b. Muir's Text Book of Pathology - ANDERSON J.R. : Edn, 12-1987.
 - c. Clinical Pathology Medical Laboratory Technical manual ROMINIC & SOOD.
 - d. Clinical Ocular Pathology – John Harry- Gery Misson, Butterworth Heinemann.
 - e. Clinical Ocular Pathology (test yourself series) – John Harry- Gery Misson, Butterworth Heinemann.

Lecture Topics

1. Inflammation and repair.
2. Infection in general.
3. Specific infections
 - a) Tuberculosis.
 - b) Leprosy
 - c) Syphilis
 - d) Fungal infection
 - e) Viral chlamydial infection
4. Neoplasia.
5. Haematology
 - a) Anaemia
 - b) Leukaemia
 - c) Bleeding disorders.
6. Circulatory disturbances
 - a) Thrombosis.
 - b) Infarction
 - c) Embolism
7. Clinical Pathology
 - a. Examination of urine.
 - b. Examination of blood smears.

Microbiology

1. **Scope and Objective** = The objective of the course is to prepare the students to study the characteristics of bacteria, Viruses, Fungi and parasites causing diseases of the eye. To apply the principles of sterilisation and disinfection in hospital and ophthalmic practice. To understand the pathogenesis of the diseases caused by the above listed organisms in the human body with particular reference to the eye infection and to apply principles of diagnostic ocular microbiology.
2. **Text and reference Books** =
 - a. Ocular Microbiology – Arvind Eye
 - b. Microbiology for the Health Sciences 3rd Edition : BURTON G.R.W.St. Louis, J.P. Lippincott Co. 1988.
 - c. Medical Microbiology – An Introduction to Infectious Diseases John C. Sherris.
 - d. Practical Medical Microbiology (PMM) : Mackie & McCarthy
 - e. Diagnostic Microbiology and Cytology of Eye – Kathleen Byrle, Eileen Burd, Khalid Tabbara, Robert Hyndiuk, Butterworth Heinemann.

Lecture Topics

1. Introduction to Bacteria, Virus, Fungus and their differentiation.
2. Life cycles and special points about common Bacteria, Virus, Fungus.
3. Morphology and principles of cultivation of bacteria.
2. Sterilisation and dis-infection generally used in laboratory and hospital practice.
3. Common bacterial infections of the eye.
4. Common fungal infections of the eye.
5. Common viral infections of eye.
6. Common parasitic infections of the eye.

T204 OPTHALMIC OPTICS

1. **Scope and Objective** = To apply concepts and principles of geometrical optics to the functional aspects of human eye. Geometrical optics solution to various defects and disorders in the eye, to study the principles of various optical instruments used.
2. **Text and reference Books**
 - a. Optics in vision, H. Obstefield, Butterworths , London, 1982.
 - b. Optics, WHA Fincham, 9th edition, Butterworths ,1980.
 - c. Optics of human eye – Smith, Etichision.

Lecture Topics

1. Introduction - Vergence and vergence techniques revised. Lens power, prism power, and cylindrical lenses.
2. Gullstrand's schematic eyes, visual acuity, stiles Crawford experiment and Binocular telescopes.
3. Emmetropia and Ametropia.
4. Correction of Spherical Ametropia.
5. Thin lens model of the eye - angular magnification - magnification of microscope, telescope. Spectacle and relative spectacle magnification. Aperture stops - entrance and exit pupils.
6. Applications - To calculate the angular magnification, dioptric power of spectacles, spectacle magnification, entrance and exit pupils, vertex distances.
7. Presbyopia
8. Aphakia.
9. Astigmatism - Applications - For e.g. to calculate the dioptric power, angular magnification of spectacles in aphakic, presbyopic patients. To calculate the position of line image in a spherocylindrical lens.
10. Laser Optics - basic laser principles - spontaneous and stimulated emission. Coherence - spatial, temporal. Laser pumping - population inversion optical feedback - laser resonator stability condition. Gas lasers, and solid lasers, Helium - neon laser - Argon - ion laser - ruby laser. Molecular laser - carbondioxide, Excimer laser. Semi conductor lasers. Lasers in medicine.
11. Holography.
12. Spatial distribution of optical information - modulation transfer functions - spatial filtering - applications.

Geometric Optics - II Practical

1. Spectrometer - minimum deviation and narrow angled prism.
2. Focimeter and neutralisation of optical lenses.
3. Dispersive power of a prism.
4. Toric lens and meniscus lens.
5. Refractive index of various Optical lenses.

T205 COMPUTER FUNDAMENTALS

1. **Scope and Objective** = This course aims at preparing the student to handle personal computers, learn basics of the current hardware and software being used. The student should be able to complete his Optometry and other professional assignment like project report, projection slides, etc. using a personal computer. He may be required to use special software programs in his career as an optometrist in the future. He should be well versed with printing all the work he has done for his assignments, use Email and Internet to his professional advantage.
2. **Text and Reference Books** =
 - a. Introduction to Personal Computers.
 - b. Personal Computers for dummies.

Lecture Topics

1. Introduction to Computers – hardware and software.
2. Introduction to operating systems and basic software use.
3. Use of Word processors, Spreadsheet and presentation programs.
4. Use of database software for clinic records.
5. Use of financial accounting software.
6. Use of Computers in medicine, specially Ophthalmic Optics.
7. Use of specialised software for Optometric use.

Second Year Term Three

T301 VISUAL OPTICS

1. **Scope and Objective** = A sound knowledge of theory in Visual Optics is a pre-requisite for Practical training in clinical refraction and related area. The objective of this course is to prepare the candidate through didactic lectures which he is expected to translate into practice at the clinics.
2. **Text and reference Books** =
 - a. Clinical Optics – Troy Fannin
 - b. Optics and Refraction –L.P.Aggarwal.
 - c. Principles of Optics and Refraction – Duke Elder.
 - d. Visual Optics and Refraction – A clinical approach DRAVID D. MICHAELS :. The C.V.Mosby & Co. 1985.

Lecture Topics

- A) Review of Geometric Optics.
 1. Vergence and power.
 2. Sign convention.
 3. Spherical refracting surface.
 4. Spherical mirror; Catoptric power.
 5. Cardinal points.
 6. Magnification.
- B) Optics of Ocular Structures
 1. Cornea and aqueous
 2. Crystalline lens
 3. Vitreous
 4. Schematic and reduced eye
- C) Refractive conditions of eye
 - a) Emmetropia.
 - b) Myopia.
 - c) Hyperopia.
 - d) Astigmatism.
 - e) Presbyopia.
- D) Refractive anomalies and their causes:
 1. Aetiology of refractive anomalies.
 2. Contributing variablities and their ranges.
 3. Populating distributions of anomalies.
 4. Optical component measurements.
 5. Growth of the eye in relation to refractive errors.

- E) Accommodation and Convergence
 - a) Far and Near point of accommodation, range of accommodation, amplitude.
 - b) Methods of measurement of Accommodation.
 - c) Near point of convergence – significance.
 - d) Methods of measurement of Convergence.
 - e) Accommodative Convergence/ Accommodation ratio

- F) Retinoscopy - principles and methods.
 - f) Retinoscopy - speed of reflex and optimum condition.
 - g) Retinoscopy - design consideration
 - h) Review of objective refractive methods.
 - i) Review of subjective refractive methods.
 - j) Cross cylinder method for astigmatism.
 - k) Difficulties in subjective tests and their avoidance.
 - l) Transposition of lenses.
 - m) Spherical equivalent.

Optometric Optics Practical Demonstrations

1. Visual acuity, stereo acuity in emmetropia.
2. Myopia and pseudomyopia, myopia and visual acuity,
3. Measurement of accommodation : near and far points and range.
4. Measurement of Convergence : near point and Adduction and abduction range.
5. Practice of Retinoscopy - Emmetropia.
6. Practice of Retinoscopy - Spherical ametropia.
7. Practice of Retinoscopy - Simple astigmatism.
8. Practice of Retinoscopy - Compound hyperopia.
9. Practice of Retinoscopy - Compound myopia.
10. Practice of Retinoscopy - Oblique astigmatism.
11. Practice of Retinoscopy - in media opacities.
12. Practice of Retinoscopy - in irregular astigmatism.
13. Interpretation of cycloplegic retinoscopic findings.

T302 DISPENSING OPTICS

1. **Scope and Objective** = This course deals mainly with the prescription of lenses, prisms and frames, which form the backbone of optometric practice, prepares the students to work competently and confidently in the Clinical environment. Imparting the knowledge about surfacing and polishing, spherical, sphero-cylindrical, and bifocal spectacle lenses. To cut finished lenses according to various frame shapes and sizes and fit them in to frames after glazing. Make them capable of assessing facial and frame shape and sizes they are taught to evaluate all parameters, which are essential for an ideal spectacle fit. To check any defects in a finished lens before dispensing the lenses to a patient.
2. **Text and reference Books** =
 - a. Principles of Ophthalmic Lenses : M.JALIE.
 - b. System for Ophthalmic Dispensing : CLIFFORD W BROOKS & IRVIN M. BORISH
 - c. Practical Aspects of Ophthalmic Optics : MARGARET DOWALIBY.
 - d. The fine art of prescribing glasses without making a spectacle of yourself - BENJAMIN MILDER & MELVIN L. RUBIN.
 - e. Spectacle Lenses – theory & Practice – Colin Fowler & Keziah Latham
 - f. Ophthalmic Lenses and Dispensing – M. Jalie

Lecture Topics

Ophthalmic Lenses Types, Manufacturing, Workshop Practice

1. Recording and ordering of Ophthalmic lenses.
2. Terminology used in Lens workshops.
3. Ophthalmic raw materials – history and general outline.
4. ISI Standards for lenses.
5. Manufacturing of Ophthalmic blanks – Plastics.
6. Plastic lenses – material types and characteristics.
7. Plastic lenses - manufacture
8. Ophthalmic lens designs – best form lenses.
9. Design of high powered lenses.
10. Bifocal design and manufacture.
11. Unusal Lens forms.
12. Faults in lenses – description.
13. Faults in lenses – detection.

Types of Ophthalmic lenses

14. Aspheric lenses.
15. High index lenses.
16. Biofocal and multifocal lenses-types and characteristics.
17. Biofocal and multifocal lenses-purposes and choice.
18. Photochromic lenses.
19. Polaroid lenses.
20. Tinted lenses - absorptive properties.

21. Tinted lenses - examples and discussions.
22. Special purpose lenses.

Spectacle Frames – theory basics (I)

1. History of spectacles.
2. Nomenclature and terminology.
3. Classification of frames – Temple position, colouration.
4. Types of frame materials – advantages and disadvantages.
5. Frame materials – Gold.
6. Frame materials – basic metal.
7. Frame materials – Plastics.
8. Manufacturing of spectacle frames – overview.
9. Face and frame measurement.
10. Dyes and colorants – lenses and frames.

Spectacle manufacturing – Optician shop (II)

1. Dispensing counter organisation.
2. Types of spectacle frames available.
3. Types of human faces.
4. Face and frame measurements.
5. Choice of frames.
6. Cosmetic dispensing – different types of faces, colours, etc.
7. Functional dispensing – various professions and age groups.
8. Special purpose frames and accessories.
9. Testing of frames – general.
10. Testing of frames – special.
11. Recording and ordering of frames and appropriate lenses.
12. Measurements for ordering spectacles – IPD, marking center, vertex distance calculations.
13. Special measurements for fitting special lenses – Bifocals, multifocals, prism lenses, etc.
14. Fitting of lenses in various types of frames.
15. Glazing and Edging Processes.
16. Glazing of Bifocals, high powered, other special lenses.
17. Faults in lenses – description and detection.
18. Final checking, adjustments to prescription spectacles.
19. Final dispensing of spectacles to customer.
20. Patient complaints, handling and correction.
21. Repairs to spectacles – Soldering, rivets for metal, plastics frames.
22. Special types of spectacles and appliances.
23. Monocells and Ptois crutches.

T303 OPTOMETRIC INSTRUMENTS

1. **Scope and Objective** = This course gives an in-depth knowledge about the construction and working of various instruments used in the Optometric practice and helps the students to use the instruments to an optimum level in diagnosis and management of ocular disorders and help them in maintenance of these instruments.
2. **Text and reference Books** =
 - a. Optometric Instrumentation.SANTOSH K. KUMAR : (SKK)
 - b. Optometric Instrumentation - DRAVID B. HENSON (DBH)
 - c. Clinical Visual Optics - BENNETT & RABBETTS.
 - d. Visual Optics and Refraction - DAVID O. MICHALES. (DOM)
 - e. Primary Care Optometry - THEODER GROSVENOR.
 - f. Practical Orthoptics in treatment of squint - T. KEITH LYLE & SYLVIA JACKSON.

Lecture Topics

- 1) Binocular Instruments.
- 2) Refractive instruments :
 - a) Test chart standards
 - b) Choice of test charts.
 - c) Trial case lenses - best forms.
 - d) Refractor (phoropter) head units.
 - e) Optical considerations of refractor units.
 - f) Trial frame design.
 - g) Near vision difficulties with units and trial frame.
 - h) Retinoscope - types available.
 - i) Adjustment of retinoscopes - special features.
 - j) Cylinder retinoscopy.
 - k) Objective optometers.
 - l) Coincidence optometers- principles and details.
 - m) Infra-red optometer devices.
 - n) The interpretation of objective findings.
 - o) Special subjective test - polarising and displacement e.g. simultant test.
 - p) Projection charts.
 - q) Illumination of the consulting room.
 - r) Time and motion study in refraction.
 - s) Furniture and accessories in the practice.
 - t) Instruments of the future.
- 3) Ophthalmoscopes and related devices:
 - a) Design of ophthalmoscopes - illumination.
 - b) Design of ophthalmoscopes - viewing.
 - c) Ophthalmoscope disc.
 - d) Filters for ophthalmoscopy.
 - e) Indirect ophthalmoscopes.
 - f) The use of the ophthalmoscope in special cases.
- 4) Lensometer, lens gauge or clock.

- 5) Slit lamp
 - a) Slit lamp systems.
 - b) Viewing microscope systems.
 - c) Slit lamps in production.
 - d) Slit lamp accessories.
 - e) Slit lamp techniques.
 - f) Slit lamp appearances.
 - g) Mechanical design in instruments.
- 6) Tonometer:
 - a) Tonometer principles.
 - b) Types of tonometers and standardization.
 - c) Use and interpretation of tonometers.
- 7) Fundus camera
 - a) The fundus camera - principles.
 - b) The fundus camera - techniques.
- 8) External eye photography - apparatus.
 - a) External eye photography - techniques.
- 9) Corneal examination
 - a) Placidos Disc,
 - b) Keratometer,
 - c) Video Keratoscopy
 - d) Corneal Topography
 - e) Specular Microscope
 - f) Aesthesiometer
- 10) Exophthalmometer
- 11) Refractionometer
- 12) Orthoptic instruments
 - a) Orthoptic instruments - haploscopes.
 - b) Orthoptic instruments - home devices.
 - c) Orthoptic instruments - pleoptics.
 - d) Historical instruments.
- 13) Colour vision testing devices.
- 14) Field of vision and screening devices:
 - a) Perimeter and the visual field.
 - b) Campimeters - fixation devices.
 - c) Illumination of field testing instruments.
 - d) Projection perimeters and campimeters.
 - e) Screening devices for field defects.
 - f) Results of field examination.
 - g) Vision screeners - principles.
 - h) Vision screeners - details.
 - i) Analysis of screener results.

T304 CLINICAL EXAMINATION OF VISUAL SYSTEM

1. **Scope and Objective** = This course is to acquaint the students regarding basic history taking and basic examination technique of a patient attending the Out Patient Department with ophthalmic complaints. The student should also become familiar with certain diagnostic treatments like visual fields, macular function test, etc to confirm the clinical findings and to help aid in diagnosis.
2. **Text and reference Books** =
 - a. External Eye Diseases – A Colour Atlas – Mark T Watts, Butterworth Heinemann.
 - b. Clinical Procedures for ocular examination - Carlson
 - c. External Eye Diseases a systemic approach Ian Mackie, Butterworth Heinemann.
 - d. Clinical Examination of Ophthalmic cases – M.L.Aggarwal & L.C.Gupta, CBS Publishers, Delhi.
 - e. Clinical Ophthalmology, Jack K. Kansi, Butterworths, 2nd edition, 1989.
 - f. Basic and Clinical Sciences - American Optometric Association.
 - g. Clinical Procedures in primary eye care – David Elliot
 - h. Diagnosis of defective colour vision – Jennie Birch, Butterworth Heinemann.

Lecture Topics

1. History of the Ophthalmic subject.
 - a) Ocular symptoms.
 - b) The past prescription - its influence.
2. Visual acuity testing - distance and near and colour vision.
3. Colour Vision – methods of testing, significance.
4. Examination of muscle balance.
4. Slit lamp examination.
 - a) Examination of eye lids, conjunctiva and sclera.
 - b) Examination of cornea.
 - c) Examination of iris, ciliary body and pupil.
 - d) Examination of lens.
5. Examination of intraocular pressure and examination of angle of anterior chamber.
6. Ophthalmoscopy - Direct and indirect.
7. Examination of fundus (vitreous and disc), choroid and retina).
8. Examination of lacrimal system.
9. Examination of the orbit.
10. Macular function test.
11. Visual field charting (central), (peripheral).
12. Neuro-ophthalmological examination.

T305 OCULAR DISEASES - I

1. **Scope and Objective** = This course is designed to provide the further Optometrist with a Comprehensive yet concise Curriculum of the field of Ophthalmology, with reference to ocular diseases. The Course reviews basic background knowledge as well as focuses on specific areas of key interest to the Optometrist. Special attention will be paid to the methods of examination in various sub-specialities of Ophthalmology.
2. **Text and reference Books** =
 - a. Basic and Clinical Science Course, American Academy of Ophthalmology (AAO), 1992-93 / 1993-94.
 - b. Parsons Diseases of the eye, STEPHEN J.H. MILLER, 17th Ed., 1984, Churchill Livingstone. (PDE).
 - c. Clinical Ophthalmology, JACK J. KANSKI, 2nd Ed., 1989 Butterworths.
 - d. The Ocular disease Manual – Meyler Robertson

Lecture Topics

1. Eyelids
 - a) Eyelid anatomy
 - b) Congenital and developmental anomalies of the eyelids.
 - c) Blepharospasm
 - d) Ectropion
 - e) Entropion
 - f) Trichiasis and symblepharon
 - g) Eyelid inflammations
 - h) Eyelid tumors
 - i) Ptosis
 - j) Eyelid retraction
 - k) Eyelid trauma
2. Lacrimal System
 - a) Lacrimal anatomy
 - b) Lacrimal pump
 - c) Methods of lacrimal evaluation
 - d) Congenital and developmental anomalies of the lacrimal system.
 - e) Lacrimal obstruction
 - f) Lacrimal sac tumors
 - g) Lacrimal trauma
3. Sclera Episclera
 - a) Ectasia and staphyloma
 - b) Scleritis, episcleritis
4. Orbit
 - a) Orbital anatomy
 - b) Incidence of orbital abnormalities
 - c) Methods of orbital examination

- d) Congenital and developmental anomalies of the orbit
- e) Orbital tumours
- f) Orbital inflammations
- g) Sinus disorders affecting the orbit
- h) Orbital trauma

5. Conjunctiva and Cornea

- a) Inflammation
- b) 1) Therapeutic principles
2) Specific inflammatory diseases
- c) Tumours
 - 1) Tumours of epithelial origina
 - 2) Glandular and adnexal tumours
 - 3) Tumours of neuroectodermal origin
 - 4) Vascular tumours
 - 5) Xanthomatous lesions
 - 6) Inflammatory lesions
 - 7) Metastatic tumours
- d) Degenerations and dystrophies
 - 1) Definitions
 - 2) Degenerations
 - 3) Dystrophies
- e) Miscellaneous conditions
 - 1) Keratoconjunctivitis Sicca (K Sicca)
 - 2) Tear function tests
 - 3) Stevens - Johnson Syndrome
 - 4) Ocular Rosacea
 - 5) Atopic eye disorders
 - 6) Benign mucosal pemphigoid (BMP) - ocular pemphigoid
 - 7) Vitamin A deficiency
 - 8) Metabolic diseases associated with corneal changes

6. Iris Ciliary body and Pupil

- a) Congenital anomalies.
- b) Primary and secondary disease of iris and ciliary body
- c) Tumours
- d) Anomalies of pupillary reactions

7. Choroid

- a) Congenital anomalies of the choroid
- b) Diseases of the choroid
- c) Tumours

Second Year Term Four

T401 OPTICS & REFRACTION

1. **Scope and Objective** = Imparting the knowledge about surfacing and polishing, spherical, spherocylindrical and bifocal spectacle lenses. To cut finished lenses according to various frame shapes and sizes and fit them into frames after glazing. Make them capable of assessing facial and frame shape and size. They are taught to evaluate all parameters which are essential for an ideal spectacle fit. To check any defects in a finished lens before dispensing the lenses to a patient.
2. **Text and reference Books**
 - a. System of ophthalmic Dispensing : CLIFFORD W. BROOKS & IRVIN M. BORISH.
 - b. Spectacle Lens technology = D.F. HORNE.
 - c. Practical aspects of Ophthalmic Optics = MARGARET DOEALIB.
 - d. Professional Ophthalmic Dispensing : RALPH DREW.

Lecture Topics

1.
 - a) Tinted and protective lenses.
 - b) Characteristics of tinted lenses.
 - c) Absorptive glasses.
 - d) Polarising filters.
 - e) Photochromic filters.
 - f) Reflecting filters.
2. Bifocal lenses.
3. Trifocal lenses.
4. Progressive addition lenses.
5. Lenticular lenses
6.
 - a) Spectacle magnifiers.
 - b) Recumbent prisms and Fresnel prisms.
 - c) Reflections from spectacle lenses, ghost images, reflections in bifocals at the dividing line.
 - d) Anti-reflection coating.
 - e) Field of view of lenses.
 - f) Size, shape and mounting of ophthalmic lenses.
7. Effective power of spectacles; vertex distance effects.
8. Spectacle magnification and relative spectacle magnification.

T402 OPTOMETRIC OPTICS AND LVA

1. **Scope and Objective** = Optometric Optics is more a clinical oriented course. The object of the course is to prepare the student to co-relate all aspects of Optics, clinical examination, diagnosis and planning Optometric management of the patient.
2. **Text and reference Books** =
 - a. Practice of Refraction = Duke Elders, Edn. 9 1991.
 - b. Optics for Clinicians = MELVIN L RUBIN, Triad, 2nd Edition, 1974.
 - c. Fine art of prescribing glasses - MELVIN L RUBIN & Benjamin Milder
 - d. Clinical optics – Troy Fennin & Theodore Grosvenor
 - e. Essentials of low vision practice – Richard B Brilliant
 - f. Low vision – Christine Dickinson

Lecture Topics

1.
 - a) Correction of spherical ametropia.
 - b) Axial versus refractive ametropia.
 - c) Ocular refraction versus spectacle refraction.
 - d) Ocular accommodation versus spectacle accommodation
 - e) Retinal image blur; depth of focus and depth of field.
- 2) Measurement of the optical constants of the eye
 - a) Corneal curvature and thickness.
 - b) Keratometry.
 - c) Curvature of the lens and ophthalmo-phakometry.
 - d) Axial and axis of the eye.
 - e) Far and Near Point of Accommodation
 - f) Subjective Methods of refraction
 - g) Objective Methods of refraction
 - h) Guideline for correction of refractive error
 - i) Patient Management.
- 3) Introduction to Orthoptics
 - a) Extra Ocular Muscles
 - b) Laws of ocular motility.
 - c) Accommodation & Convergence
 - d) Binocular vision
 - e) Diplopia, Confusion.
 - f) Type of deviations
 - g) Introduction to Orthoptic examination
 - h) Introduction to Orthoptic instruments

Optometric Optics Practical Demonstrations

1. Visual acuity, stereo acuity in emmetropia.
2. Myopia and pseudomyopia, myopia and visual acuity,
3. Myopic correction - subjective verification - monocular and binocular.
4. Hypermetropia - determination of manifest error subjectively.
5. Hypermetropic correction : subjective verification.
6. Demonstration of astigmatism.

Use of slit and keratometry to find the principal meridians.

7. Astigmatism : Fan - subjective verification tests.
8. Astigmatism : Cross Eye - subjective verification tests.
9. Measurement of accommodation : near and far points and range.
10. Presbyopic correction and methods : accommodation reserve, balancing the relative accommodation and cross grid test.
11. Methods of differentiating axial and refractive ametropia.
12. Practice of Retinoscopy - Emmetropia.
13. Practice of Retinoscopy - Spherical ametropia.
14. Practice of Retinoscopy - Simple astigmatism.
15. Practice of Retinoscopy - Compound hyperopia.

Low Vision Aids

1. **Scope and Objective** = Patients both Young and old, who suffer from irreversible and incurable conditions which cannot be managed by Conventional therapy, can be helped to perform their tasks with Low Vision Aids, prescribing of which is a Special of Optometrists.
2. **Text Book & Reference Books**
 - a. Low Vision Care -EDWIN B. MEHR & ALLAN N.FREID The Professional Press, Chicago 1975.
 - b. Optometric Management of Visual Handicap - HELEN FARRALL, Blackwell Scientific Publications, London 1991.
 - c. Art and practice of Low Vision - Second Edition -Paul freeman, Butterworth Heinemann

Lecture Topics:

1. Identifying the low vision patient.
2. History taking
3. Effects of the eye condition on functional vision.
4. Refraction
5. Diagnostic procedures in low vision cases management.
6. Evaluating functional vision: Amsler Grid and fields defects.
7. Optical & non optical Low vision aids
8. Optics of low vision aids
9. Guide to selected low vision aids.
10. Demonstrating aids
11. Teaching the patient to use aids.
12. Fitting spectacles telescope and glasses
13. Children with low vision.
14. Light, glare and contrast in low vision care and rehabilitation
15. Optical devices to help people with field defects.

T403 OCULAR DISEASES - II

1. **Scope and Objective** = This course is designed to provide the further Optometrist with a Comprehensive yet concise Curriculum of the field of Ophthalmology, with reference to ocular diseases. The Course reviews basic background knowledge as well as focusses on specific areas of key interest to the Optometrist. Special attention will be paid to the methods of examination in various subspecialties of Ophthalmology.
2. **Text and reference Books**
 - a. Basic and Clinical Science Course, American Academy of Ophthalmology (AAO).
 - b. Parsons Diseases of the eye = STEPHEN J.H. MILLE, Churchill Livingstone. (PDE).
 - c. Clinical Ophthalmology = JACK J. KANSKI, 2nd Ed., 1989 Butterworths.
 - d. The Ocular Disease manual – Meyler Robertson
 - e. Manual of ocular fundus examination – Theo Dorion
 - f. Atlas of Peripheral Ocular Fundus – Jones, Butterworth Heinemann.

Lecture Topics

1. VITREOUS
 - a) Developmental abnormalities.
 - b) Hereditary hyaloido retinopathies.
 - c) Juvenile retinoschisis.
 - d) Cholesterolosis.
 - e) Vitreous haemorrhage.
 - f) Blunt trauma and the vitreous.
 - g) Inflammation and the vitreous.
 - h) Parasitic infestations.
 - i) Vitreous complications in cataract surgery.
2. RETINA
 - a) Retinal vascular diseases.
 - b) Diseases of the choroidal vasculature, Bruch's membrane, and retinal pigment epithelium (RPE).
 - c) Retinal tumours and retinoblastoma.
 - d) Other retinal disorders.
 - 1) Retinal inflammations.
 - 2) Metabolic diseases affecting the retina.
 - 3) Miscellaneous disorders.
 - 4) Electromagnetic radiation effects on the retina.
 - e) Retinal physiology and psychophysics.
 - f) Hereditary macular disorders (including albinism).
 - g) Peripheral retinal degenerations.
 - h) Retinal holes and detachments.
 - i) Intraocular foreign bodies.
 - j) Photocoagulation.
3. NEURO-OPHTHALMOLOGY
 - a) Neuro-ophthalmic examination.

- 1) History and Visual function testing.
 - 2) Technique of pupillary examination.
 - 3) Ocular motility.
 - 4) Checklist for testing.
- b) Visual sensory system.
- 1) The retina, optic disc, optic nerve, optic chiasma, optic tracts.
 - 2) The lateral geniculate body, optic radiations, visual cortex.
 - 3) The visual field.
 - 4) Disorders of visual integration.
- c) Ocular motor system
- 1) Supranuclear control of eye movements.
 - i) Saccadic system.
 - ii) Clinical disorders of the saccadic system.
Gaze palsies.
Parkinson's disease.
 - iii) Smooth pursuit system and disorders.
 - iv) Non-visual reflex system
 - v) Position maintenance system.
 - vi) Nystagmus
 - 2) Ocular motor nerves and medial longitudinal fasciculus.
- d) The facial nerve.
- e) Pain and sensation from the eye.
- f) Autonomic nervous system disorders.
- g) Selected systemic disorders with neuro-ophthalmologic signs.

4. LENS

- a) Anatomy and pathophysiology
 - 1) Normal anatomy and aging process.
 - 2) Developmental defects.
 - 3) Acquired lenticular defects.
- b) Management of lenticular defects.

5. TRAUMA

- a) Anterior segment trauma.
- b) Posterior segment trauma.

6. BLINDNESS

- a) Blindness - definitions.
 - 1) Causes.
 - 2) Social implications.
 - 3) Rationale in therapy
- b) Drug induced ocular diseases.

T404 OPTOMETRIC INVESTIGATIONS

- 1) **Scope and Objective** = This course is designed to provide the Optometrist with a comprehensive and concise understanding of all Ophthalmic investigations. The Course reviews basic background knowledge as well as focuses on specific areas of key interest to the Optometrist. Special attention will be paid to the methods of examination and instruments expected to be used by an Optometrist in an Ophthalmic hospital as well as in an optical establishment.
- 2) **Text and reference Books**
 - a) Clinical procedures in Primary Eye Care – David Elliott, Butterworth Heinemann.
 - b) Basic and Clinical Science Course, American Academy of Ophthalmology (AAO).
 - c) Clinical Ophthalmology = JACK J. KANSKI, 2nd Ed., 1989 Butterworths.

Lecture Topics

1. Visual Acuity Testing & Theory
2. Colour Vision Testing & Theory
3. Electro Retino Graphy . E.R.G.
4. Electro Oculo Graphy E.O.G.
5. Elewctro Myo Graphy E.M.G.
6. Electro Nystagmo Graphy E.N.G.
7. Fluorescein Angiography F.A.
8. Ultrasono Graphy U.S.G.
9. Visual Evoked Response / Potensial V.E.R or V.E.P.
10. Tonometer, Tonometry & Tonography.
11. Visual Field Charting & Perimetry
12. Adaptation & Adaptometry
13. Berman's Locator.
14. Cryo Technique
15. Diathermy.
16. Photo-coagulation
17. Method's of examination (Focal illumination)
18. Slit lamp & Attachments
19. Gonioscopy
20. Pachometry
21. Ocular Photography (Ant. Seg)
22. Contact & Trans-illumination
23. pH Testing & Schirmer's Test
24. Fluorescein Staining & Techniques.
25. Syringing & Lacrimal Function Test
26. Ophthalmascopy
27. Retinoscopy
28. Auto-Refracton
29. Keratometry
30. Ophthalmic Lens Measuring Instruments.

T405 HOSPITAL PROCEDURES AND MEDICAL PSYCHOLOGY

HOSPITAL PROCEDURES

Lecture Topics

1. Administration
3. Medical Records department.
4. Reception.
5. Computer Section - appointment scheduling, accounts.
7. Laboratory – all investigations performed.
9. Correspondence.
10. Stores.

MEDICAL PSYCHOLOGY

Lecture Topics

1. Introduction to Psychology - Definitions - Schools of thought; fields of Psychology.
2. Man in society.
3. Emotions and feelings.
4. Motivation - Human motivation.
5. Personality - what it is; concept of body image.
6. Normality and abnormality - major and minor psychiatric entities.
7. Why Medical Psychology ?
8. The patient in his milieu - socio-economic aspects.
9. The patient-therapist relationship - The initial encounter - basic principles of the therapist.
10. Illness - its impact on the patient.
11. Eye diseases - their impact on the patient.
12. The patient's adaptation to variants of normalcy in vision- prejudices and biases.
13. Rehabilitation of the blind.

Third Year Term Five

T501 CONTACT LENS PART (I)

1. **Scope and Objective** = The subject covers all basic aspects of Contact Lenses. With a revision of Ocular Anatomy & Physiology, Visual Optics, the course will also deal with Optics of Contact Lenses, raw materials and pre-fitting examination.
2. **Text and reference Books**
 - a. Contact Lenses – Dr. V.K. Dada.
 - b. Contact Lenses Practice = Robbert B. Mandell
 - c. RGP Lens fitting, Carolyn Begley, Butterworth Heinemann.
 - d. Contact Lenses = Stone J. and Phillips A.J., 3rd edition, Butterworths, 1989.

Lecture Topics

1. History of Contact lenses.
2. Related ocular anatomy and physiology.
3. Related Visual Optics.
4. Contact Lens materials, terminology, classification.
5. Optics of Contact Lenses, comparison spectacles.
6. Indications and contraindications.
7. Advantages and disadvantages of types of Contact lenses.
8. Manufacturing Rigid and Soft Contact Lenses – various methods.
9. Pre-Fitting examination – steps, significance, recording of results.
10. Instruments used for examination.
11. Special Investigations in pre-fitting examinations.
12. Keratometry and Corneal topography.
13. Slit lamp examination.
14. Discussion with patient, choice of lens type.
15. Fitting philosophies of Contact Lenses – general outline.
16. Fitting Rigid Contact Lenses.
17. Using trial lenses – calculations involved.
18. Methods of assessment of Contact Lens fit.
19. Types of fit – Steep, Flat, Optimum – on spherical cornea.
20. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses.
21. Types of fit – Steep, Flat, Optimum – on Toric cornea with toric lenses.
22. Calculation and finalising of Contact lens parameters.
23. Ordering Rigid Contact Lenses – writing a prescription to the Laboratory.
24. Checking and verifying Contact lenses from Laboratory.
25. Modifications possible with Rigid lenses.
26. Components of Lens Care systems for Rigid lenses.
27. Contact lens solutions – composition, necessity, advantages.
28. Teaching the patient to insert and remove Rigid lenses.
29. Common handling instructions to first time wearers.
30. Special instructions to the patient wearing Rigid Gas Permeable Contact Lenses.

T502 BINOCULAR VISION AND OCULAR MOTILITY

1. **Scope and Objective** = A sound theoretical knowledge of the binocular vision paves the way for clear understanding of the physiology of the eye in the clinics. The theories of binocular vision and basics of Orthoptics included in the theory, forms the background for the student to understand binocular vision and ocular motility disorders.
2. **Text and reference Books**
 - a. Comprehensive review of Orthoptics and ocular motility – theory, therapy, surgery – 2nd edition, Jane Hurrt, Antonia Rasicovia, Charles Windsor – C.V.Mosby & Co.
 - b. Von Noorden's Binocular Vision and Ocular Motility – Gunter K von Noorden, 2^{ne} edition, C.V.Mosby & Co.
 - c. Handbook of Orthoptic principles = G.T. Willoughby Cashell, Isobel Durran, Churchill Living stone.
 - d. Binocular Vision – Foundations & Applications.
 - e. Strabismus – Forth Edition – Julio Prieto Diaz – Butterworth Heinemann

Lecture Topics

- 1) General introduction.
- 2) Binocular Vision and Space perception development.
 - a) Fusion, diplopia, correspondence.
 - b) Stereopsis, Panum's area, BSV.
 - c) Stereopsis and monocular clues - significance.
 - d) Egocentric location, clinical applications.
 - e) Theories of Binocular vision.
 - f) Relative subjective visual direction.
 - g) Alternation – theory of Binocular Vision.
 - h) Projection theory of Binocular Vision.
 - i) Motor theory of visual orientation.
- 3) Summary of Anatomy of Extra Ocular Muscles.
 - a) Rectii and Obliques, LPS.
 - b) Innervation & Blood Supply.
- 4) Physiology of Ocular movements.
 - a) Center of rotation, Axes of Fick.
 - b) Action of individual muscle.
- 5) Laws of ocular motility
 - a) Donder's and Listing's law
 - b) Sherrington's law
 - c) Hering's law
- 6) Uniocular & Binocular movements - fixation, saccadic & pursuits.
 - a) Version & Vergence.
 - b) Fixation & field of fixation
 - c) Nystagmus.

- 7) Near Vision Complex
 - a) Accommodation
 - i) Definition and mechanism (process).
 - ii) Methods of measurement.
 - iii) Stimulus and innervation.
 - iv) Types of accommodation.
 - v) Anomalies of accommodation – aetiology and management.
 - b) Convergence
 - i) Definition and mechanism.
 - ii) Methods of measurement.
 - iii) Types and components of convergence - Tonic, accommodative, fusional, proximal.
 - iv) Anomalies of Convergence – aetiology and management.
- 8) Pupillary Construction.
 - a) Relation to Accommodation and Convergence.
 - b) Physiologic significance.
 - c) Reaction to fusion.
- 9) Visual Acuity
 - a) Definition & basic concepts.
 - b) Factors of affecting Visual acuity.
 - c) Optical effects of spectacles.
 - d) Aniseikonia
- 10) Sensory adaptations
 - a. Confusion
 - b. Suppression
 - c. Abnormal Retinal Correspondence
 - d. Blind spot syndrome.
- 11) Amblyopia
 - a. Definition & types
 - b. Investigations
 - c. Management

T503 SYSTEMIC DISEASES AND THE EYE

1. **Scope and Objective** = The course aims at acquainting the students with certain common medical ailments which have serious ocular involvement. Basic fact about the patho-physiology of the disease, the clinical features, essentials of diagnosis and basic management will be emphasized with the special reference to the eye.
2. **Text and reference Books**
 - a. Davidson's principles and practice of medicine - J. Macleod C. Edwards & Ian Booheir, ed. John Macleod ,14th edition ELBS/ Churchill Livingstone (PPM)
 - b. Pathologic Basis of Disease - Robbins , Cottran & Kumar, Igaku –Shoin /Saunders.
 - c. Parson's Diseases of the eye - Stephan J.H. miller, 17 edition , churchill Livingstone.
 - d. Clinical Ophthalmology - Jack Kansi (JJK),1st edition ,Butterworths
 - e. Essential Immunology - Ivan M Roitt: 6th edition , ELBS/Blackwell Scientific Publications
 - f. Parasitology - K.D.Chattergy,12th edition , (page no. 107-238) ,Chattergy
 - g. Medical Handbook of common clinical emergencies - Publishers Ariga, Gowda, Sundar, 2nd edition, Affiliated East- West Press (P) Ltd.
 - h. Drugs Medications and eye – Michael Doughty – Butterworth Heinemann
 - i. Ocular Manifestations of systemic diseases – Bernard Blaustein – Butterworth Heinemann

Lecture Topics

1. ARTERIAL HYPERTENSION
 - Pathophysiology, classification, clinical examination, diagnosis, complications, management.
 - Hypertension and the eye.
2. DIABETES MELLITUS
 - Pathology, classification, clinical features, diagnosis, complications, management.
 - Diabetes mellitus and the eye.
3. ACQUIRED HEART DISEASE - EMBOLISM.
 - Rheumatic fever - Pathophysiology, classifications, diagnosis, complications, management.
Embolism.
Subacute bacterial endocarditis.
4. CANCER - INTRODUCTION
 - Definitions, nomenclature, characteristics of benign and malignant neoplasms.
 - Grading of staging of cancer, diagnosis, principles of treatment.
 - Neoplasia and the eye.
5. CONNECTIVE TISSUE DISEASE
 - Anatomy and pathophysiology : Arthritis.
 - Eye and connective tissue disease.

6. THYROID DISEASE

- Anatomy and physiology of the thyroid gland, classification of thyroid disease.
- Diagnosis, complications, clinical features, management, thyroid disease and the eye.

7. TUBERCULOSIS :

- Etiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment, tuberculosis and the eye

8. HELMINTHIASIS

- Classification of helminthic diseases, Schistosomiasis, principles of diagnosis and management.
- Helminthic disease and the eye (Taenia, Echinococcus, Larva migrans).

9. COMMON TROPICAL MEDICAL AILMENTS (MALARIA, LEPROSY ETC.)

- Introduction to tropical diseases; malaria.
- Tropical diseases and the eye - leprosy, toxoplasmosis, syphilis, trachoma.

10. MALNUTRITION

- Etiology, protein energy malnutrition, water electrolytes, minerals, vitamins, nutritional disorders and the eye.

11. INTRODUCAION TO IMMUNOLOGY

- Introduction, components of the immune system, principle of immunity in health, immunology in disease, immunology and the eye.

12. NEUROLOGICAL DISORDERS - STROKE/CVA

- Disseminated sclerosis and subacute combined degeneration.
- Anatomy with pathophysiology.
Disseminated sclerosis, subacute combined degeneration.
- Eye and connective tissue disease.

13. GENERAL MEDICAL EMERGENCIES - FIRST AID

- Ocular/general.

14. GENETICS

- Introduction to Genetics
- Organization of the cell.
- Chromosome structure and cell division
- Gene structure and basic principles of genetics.
- Genetic disorders and their diagnosis
- Genes and the eye.
- Genetic counselling and genetic engineering.

T504 MAJOR EYE DISEASES

1. **Scope and Objective** = To learn in details of the etiology, differential diagnosis and management aspects of major eye diseases which are main causes of blindness in India. The scope of the course should cover how an Optometrist can play a vital role in diagnosis and management of such diseases when he is working as part of a medical team or even in private clinic. Points about urgent, emergency and routine referral of patient with diagnosed to have such diseases should be understood by the student.
2. **Text and reference Books** =
 - a) Manual of Ocular fundus examination - Theo Dorion – Butterworth Heinemann
 - b) Cataract – William Douthwaite, Butterworth Heinemann.
 - c) Glaucoma – A colour manual for diagnosis and treatment, 2nd edition - Kanksi, Salmon, Butterworth Heinemann.
 - d) The Glaucoma handbook – Anthony Litwak, Butterworth Heinemann.
 - e) Macular Disorders – Anthony Cavallerano, Butterworth Heinemann.

Lecture Topics

1. Cataract
2. Glaucoma
3. Retinal detachment
4. Corneal ulcer & opacities
5. Visual loss – ophthalmic lesion
6. Diabetic Retinopathy
7. Macular degeneration
8. Chemical burns

T505 NUTRITION

1. **Scope and Objective** = the course is designed to bring out the role of nutrition in “EYE-CARE” Highlighting the role of various nutrients. Emphasis is on malnutrition related eye disorders and the role of therapeutic nutrition in Ophthalmology.
2. **Text and reference Books**
 - a. Normal and Therapeutic Nutrition : Corinne H. Robinson & Harilyn R. Lawler –1986.
 - b. Introductory nutrition : Helen a. Guthrie –1986.
 - c. Nutrition & dietetics : Dr. M.Swaminathan
 - d. Manual of practical pediatric Nutrition :Dr. Gnana Sundaram
 - e. Essentials of Nutrition and Diet Therapy :Sue Rodwell Williams
 - f. Nutritive Value of Indian Foods –National Institute of Hyderabad

Lecture Topics

1. INTRODUCTION
History of Nutrition, Nutrition as science, Food groups, RDA
Balanced diet, diet planning.
2. ENERGY
Units of energy, Measurement and energy value of food, Energy expenditure
Total energy/calorie requirement for different age groups and diseases
Satiety value, Energy imbalance - obesity, starvation.
3. PROTEINS :
Sources and functions, Essential and non-essential amino acids, Incomplete and complete proteins, Supplementary foods, PEM and the eye, Nitrogen balance, Changes in the protein requirement.
4. FATS:
Functions and sources, Essential fatty acids, Excess and deficiency, Lipids and the eye, Hyperlipidemia, Heart diseases, Atherosclerosis.
5. MINERALS :
General functions and sources, Macro and micro minerals associated with the eye deficiencies and excess- ophthalmic complications (eg.) Iron, calcium, iodine, etc.
6. VITAMINS :
General functions, food sources, Vitamin deficiencies and associated eye disorders with particular emphasis on vitamin ‘A’.
7. MISCELLANEOUS :
Measles and associated eye disorders, low birth weight.

S506 PUBLIC HEALTH AND COMMUNITY OPTOMETRY

1. **Scope and Objective** = The objective of the course is to enable the student to identify and manage the common and important ocular problems in the community and to investigate an epidemic of ocular diseases and to institute control measures. It is also to assess the effect of social, cultural, and economic characteristic of the community on its health status with special reference to ocular diseases.
 - To organize health education programs in the community.
 - To elicit participation in national program of prevention of blindness.
 - To apply the principles of community screening for the diagnosis of visual disorders.
 - To apply the epidemiological principles to assess the risk factors and for the control of the diseases.

2. **Text and reference Books**
 - a. Oxford Text Book of Public Health & Preventive Medicine (Vol. I to IV)
 - b. MAXCY AND ROSENAU : Text Book of Public Health & Preventive Medicine.
 - c. NEWCOMB R. D. & JOLLEY J L : Public health & Community Optometry, 1980.
 - d. Text Book Of Public and Preventive Medicine (J.E. PART).
 - e. Environmental Vision – Donald Pits – Butterworth Heinemann
 - f. Work and the eye – Rachel North – Butterworth Heinemann
 - g. Ocular immunology in health and disease - Steven Koevary – Butterworth Heinemann
 - h. Ophthalmic research and epidemiology – Stanley Hatch – Butterworth Heinemann
 - i. Professional communication in eye care – Carolyn Begley – Butterworth Heinemann

Lecture Topics

1. PHILOSOPHY OF PUBLIC HEALTH
 - a) History of public health medicine.
 - b) History of public health optometry (including epidemiology, man power, projections, community reimbursement mechanisms).
2. HEALTH CARE SYSTEMS
 - a) Organization of health services (principles of primary, secondary and tertiary care.)
 - b) Determinants of health care delivery system.
 - c) Planning of health services (including relevant legislation and implications to Optometric practice).
 - d) Health economics.
 - e) Health manpower protection and in the practice of ophthalmology.
 - f) Third party involvement in financing health care services (including both governmental and non-governmental programs).
 - g) Quality assurance in patient care services.
3. MODES OF HEALTH AND VISION CARE DELIVERY
 - a) Solo and group practice modes
 - b) Multidisciplinary, interdisciplinary and institutional practice modes.
 - c) Optometry's role as a primary health care profession.

Third Year Term Six

T601 CONTACT LENSES (II)

1. **Scope and Objective** = The subject covers all basic aspects of Contact Lenses. With a revision of Ocular Anatomy & Physiology, Visual Optics, the course will also deal with Optics of Contact Lenses, raw materials and pre-fitting examination.
2. **Text and reference Books**
 - a. Contact Lenses – Dr. V.K. Dada.
 - b. IACLE modules
 - c. Contact Lenses Practice = Robbert B. Mandell
 - d. Contact Lenses = Stone J. and Phillips A.J., 3rd edition, Butterworths, 1989.
 - e. The contact lens manual – Andrew Gasson – Butterworth Heinemann
 - f. Corneal Physiology and disposable contact lenses – Herbert Kaufman, Hikaru Hamano, Butterworth Heinemann.
 - g. Anterior segment complications of contact lens wear (Second edition) – Joel A Silbert – Butterworth Heinemann
 - h. Marketing, Managing and Contact Lenses – Robert Koetting, Butterworth Heinemann.

Lecture Topics

1. Soft Contact Lens – raw materials, classification, terminology, etc.
2. Manufacturing Soft Contact Lenses – various methods – advantages & disadvantages.
3. Various designs of Soft Contact Lenses – advantages, disadvantages.
4. Pre-Fitting examination – steps, significance, recording of results.
5. Special points for in pre-fitting examination of Soft Contact Lenses.
6. Discussion with patient, choice of lens-type.
7. Fitting philosophies of Contact Lenses – general outline.
8. Fitting Soft Contact Lenses – methods – Trial set method.
9. Using trial lenses – calculations involved.
10. Fitting Soft Contact Lenses – methods – first fit method.
11. Methods of assessment of Soft Contact Lens fit.
12. Types of fit – Steep, Flat, Optimum – on spherical cornea.
13. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses.
14. Types of fit – Steep, Flat, Optimum – on Toric cornea with toric lenses.
15. Calculation and finalising of Soft Contact Lens parameters.
16. Ordering Soft Contact Lenses – writing a prescription to the Laboratory.
17. Fitting Soft lenses from stock – advantages, limitations, precautions.
18. Checking and verifying Soft Contact lenses.
19. Components of Lens Care systems for Soft Contact Lenses.
20. Contact lens solutions – composition, necessity, advantages.
21. Teaching the patient to insert and remove Soft lenses.
22. Common handling instructions to first time wearers.
23. Special instructions to the patient for using Soft lenses.
24. Special Soft lenses – Cosmetics, Disposable, Toric,.
25. Special Rigid Lenses and designs – Toric, Keratoconus, etc.

26. Special considerations for fitting Contact Lenses – Children, irregular cornea, Unilateral Aphakia, Sports, one eyed patients, post RK, post PRK.
27. Ortho-Keratology and myopia.
28. Fitting Bifocals and multifocal – RGP & Soft lenses.
29. After care and follow-up for all Contact Lens patients.
30. Patient Problems – identification, differential diagnosis and management.

T602 ADVANCED ORTHOPTICS

- 1) **Scope and Objective** = A sound theoretical knowledge of the binocular vision paves the way for clear understanding of the physiology of the eye in the clinics. The theories of binocular vision and basics of Orthoptics included in the theory, forms the background for the student to understand binocular vision and ocular motility disorders.
- 2) **Text and reference Books**
 - a. Comprehensive review of Orthoptics and ocular motility – theory, therapy, surgery – 2nd edition, Jane Hurrt, Antonia Rasicovia, Charles Windsor – C.V.Mosby & Co.
 - b. Von Noorden's Binocular Vision and Ocular Motility – Gunter K von Noorden, 2ne edition, C.V.Mosby & Co.
 - c. Handbook of Orthoptic principles = G.T. Willonghby Cashell, Isobel Durran, Churchill Living stone.
 - d. Binocular Vision – Foundations & Applications.

Lecture Topics

- 1) Orthoptic check-up and special instruments.
 - a) Routine Orthoptic examination.
 - b) Special Orthoptic investigation.
 - c) Instruments used in Orthoptics.
 - d) Diagnosis, prognosis & management methodologies.
- 2) Neuro-muscular anomalies
 - a) Classification
 - b) Hetrophoria & hetrotropia
 - c) Orthophoria
 - d) Concomitant & non-concomitant
 - e) Paralytic squint
- 3) Aetiology
- 4) Factors responsible
- 5) Role of accommodation & convergence.
- 6) Genetics and occurrence of squint and binocular vision problems.
- 7) Outline of Routine Orthoptics Examination.
- 8) Subjective symptoms – description and significance.
- 9) History – recording and significance.
- 10) Measurement of angles of deviation.
- 11) Sensory signs of patients.
- 12) Clinical picture of types of squint
 - a) Accommodative
 - b) Intermittent
 - c) Altemate
 - d) A.& V . Phenomenon
- 13) Paralytic squint
- 14) Special forms of squint

T603 APPLIED & CLINICAL OPTOMETRY

Pediatric Optometry

1. **Scope and Objective** = The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.
2. **Text and reference Books**
 - a. Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982.
 - b. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V.Mosby Co. St. Louis,1980.
 - c. Assessing children's vision – Susan Leat – Butterworth Heinemann
 - d. Clinical Pediatric optometry – Leonard Press, Bruce Moore – Butterworth Heinemann
 - e. Paediatric Neuro –ophthalmology – Robert Tomsak – Butterworth Heinemann
 - f. Vision Problems in childhood – Terry Buckingham, Butterworth Heinemann.

Lecture Topics

1. History = Genetic factors, Prenatal factors, Perinatal factors, Post natal factors.
2. Measurement of visual acuity.
3. Normal appearance, pathology and structural anomalies of
4. Orbit, Eye lids, Lacrimal system, Conjunctiva, Cornea, Sclera
5. Anterior chamber, uveal tract, pupils
6. Lens, vitreous, fundus
7. Oculomotor system
8. Measurement of refractive status
9. Determining binocular status
10. Determining sensory moter adaptability
11. Compensatory treatment and remedial therapy for :
12. Myopia, Pseudo myopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia.
13. Remedial and compensatory treatment of strabismus and nystagmus.
14. Vergence and accommodation.
15. Delayed development

Occupational Optometry

1. **Scope and Objective** = The objective is to prepare the student to know the visual requirements of various jobs, effects of physical, chemical, and other hazards on eye and vision. The Optometrists should be able to identify occupational causes of visual and eye problems; to be able to prescribe suitable corrective lenses and eye protective wear and be able to set visual requirements, standards for different jobs.
2. **Text and Reference Books**
 - a. Encyclopedia of Occupational Health and Safety, ILO Publication, 1983 Vol . I & II.
 - b. IES Lighting Handbook (LH) 1984. IES Publication, NY1985.
 - c. IES Lighting Education Introductory Lighting (LE) 1985. IES Publication N.Y.1985
 - d. Guide to Occupational and other Visual needs- HOLMES C. JOLLIFF H & GREGG J.; 1958.
 - e. Occupational eye diseases and injuries - JOSEPH MINTON, William Heineann Medical Book Ltd., 1949.

- f. Environmental Vision – Donald Pits- Butterworth Heinemann
- g. Work and the eye – Rachel North – Butterworth Heinemann
- h. Ocular immunology in health and disease – Steven Koevary – Butterworth Heinemann
- i. Ophthalmic research and epidemiology – Stanley Hatch – Butterworth Heinemann
- j. Professional communication in eye care – Carolyn Begley – Butterworth Heinemann
- k. Sports Vision – D.F.C. Loran, C J Mac Eween, Butterworth Heinemann.

Lecture Topics

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.
2. Acts and Rules.
Factories Act and Rules.
Workmen's Compensation Act, ESI Act etc.
3. Occupational diseases/occupation related diseases caused by physical agents, chemical agents and biological agents.
4. Occupational hygiene/environmental monitoring.
Recognition, evaluation, and control of hazards.
Illumination – definition, measurements and standards.
5. Occupational safety.
Causes of accidents, Vision, lighting colour and their role.
Accident analysis, Accidents prevention.
6. Ocular and visual problems of occupation.
Electromagnetic radiation.
Ionising, Non-ionising – Infra red, Ultra violet, Microwave, LASER.
Injuries - Medical. Chemical
Toxicology - metals, chemicals
7. Prevention of occupational diseases.
Medical examination/medical monitoring.
Pre-employment/pre-placement.
Periodic.
8. Personal protective equipment.
General
Goggles, face shields, etc.
Selection shields etc.
Selection and use.
Testing for standards.
9. Standards.
Visual standards for jobs.
10. Problems of special occupational groups.
Drivers, pilots and others.
11. Field work – submission of reports.
Visits to : Regional Labour Institute, Selected industries.
12. Visual display units (terminals) VDU/VDT.
Contact Lens and work.
Pesticides – general and visual and ocular defects.

Geriatric Optometry

1. **Scope and Objective** = The Optometric examination and management of senior citizens requires different approach. The purpose of this course is to provide comprehensive instructions, which will guide the students to take appropriate Visual Care of the elderly.
2. **Text and reference Books**
 - a. Vision of the Aging Patient - HIESCH M J & WICK R E (An Optometric Symposium) 1960.
 - b. Vision and Aging - A.J. ROSSENBLOOM Jr & M.W.MORGAN, Butterworth-Heinemann,1993.
 - c. Clinical Geriatric Eye Care – Sheree Aston, Joseph Maino – Butterworth Heinemann
 - d. Clinical Decision making in Optometry – Ellen Ettinger, Michael Rouse, Butterworth Heinemann.

Lecture Topics

1. Structural changes in eye.
2. Physiological changes in eye.
3. Optical and refractive changes in eye.
4. Aphakia – its correction.
5. Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye etc.

S604 LAW AND OPTOMETRY

1. **Scope and Objective** = A presentation of the responsibilities and rights of the optometrist in a factual context, enabling him to understand his place in society and in the health care team. The method which make for effective practice.
2. **Text and reference Books** =
 - a. Business Aspects of Optometry – John Classe, Donald Lakin, Butterworth Heinemann.
 - b. Business Awareness for Optometry – Nizar Hirji, Butterworth Heinemann.
 - c. Management for Eye Care Practitioner – Irving Bennett, Butterworth Heinemann.
 - d. Management for Opticians, 2nd edition, Thomas Appler, Raymond Dennis, Eric Muth, Butterworth Heinemann.
 - e. Marketing, Managing and Contact Lenses – Robert Koetting, Butterworth Heinemann.
 - f. Ophthalmic research and epidemiology – Stanley hatch, Butterworth Heinemann.

Lecture Topics

1. Various laws governing medical and para-medical professions in the country.
2. The Consumer Act with respect to Optometry and dispensing of Optical aids.
3. Legal processes of direct interest to optometry.
4. International optometry.
5. National legislation for optometry.
6. Important foreign optometry laws.
7. Management in industry and commerce.
8. Personal and professional (Practice) insurance.
9. Partnership and alternatives.
10. Employment and Contracts.
11. Examples of difficulties found in practice.
12. Negligence.
13. Ethics-general and special Optometric.
14. The nature of the professions.
15. The optometrist as a profession person.

Practical Work = The following should be included.

1. Library reference to legal documents.
2. Perusal of specimens of balance sheet and account.
3. Visits to varied types of firms to view organization and methods.
4. Visits to office of optical organization.
5. Mock trials involving optical subjects.

Discussions should include

1. Legal environment and techniques – history – law and equity.
2. History and theory of licensure.
3. Licensure as a means of internal and external discipline – unprofessional conduct – incompetence – gross immorality.
4. International Optometry – important foreign optometry law.
5. The Optometrist in court.

6. Malpractice – Theory of liability – damages – minimizing malpractice claims.
7. Insurance and Negligence.
8. Ethics – professional ethics.
9. Laws governing practice of medical profession and para-medical profession in India.
10. Registered medical practitioner – laws against practice of medicine of those unregistered – Medical Council of India – Dental Council –Nursing Council.
11. Present rules and regulations – laws regarding optical product manufacturers – dispensing in India.
12. Opticians – Are they registered? Dispensing opticians – Rules in U.K.

S605 BASIC ACCOUNTANCY & PUBLIC RELATIONS

1. **Scope and Objective** = The Optometrist is a professional and a businessman. He should be made aware of the needs of small business in terms of basic accounting procedures like cash book, bank book, daily ledger, accounts statements, Income tax laws, sales tax and shop act provisions which may be applicable to his business in future. He should also be made aware about the possibilities of making a project report for any new business activity, sources of getting loans from banks, financial institutions, etc.

ACCOUNTANCY

Lecture Topics

1. Introduction.
2. Terms used in accounts, Principles of accountancy.
3. Journal and journalizing.
4. Ledger and ledger posting.
5. Trial balance
6. Subsidiary books, Petty cash book, Sales register, Purchase register, Stock register.
7. Bank reconciliation.
8. Depreciation and other adjustments.
9. Balance sheet and profit and loss accounts statements.
10. Preparation of Final accounts.
11. Income tax and Sales tax (general ideas only).
12. Project report and financial viability of a project.
13. Costing in practice. (Buying, stock-keeping, assessment of proper fees (honorarium), and costing of appliances.)
14. Banking procedures.

PUBLIC RELATIONS

DEFINING THE SUBJECT – THEORY AND PRACTICE.

1. Definitions.
2. Public Relations – its distinction from publicity, propaganda and advertising.
3. The universe of Public Relations – internal and external aspects of PR.
4. Phases of P.R. = Analysis of the internal and external environment – formulating and implementing PR policy-feedback, research and evaluation.
5. The benefits of P.R.= Image building, promotion of product or services, better employee, government and community relations.

METHODS OF PUBLIC RELATIONS.

1. Press Relation: Writing and issuing a press release – Press conference – facility visit and open house – letters to the editor – assembling press activity.
2. The printed word: Style, colour and design – knowledge of typography and layout – direct mail, publicity material and house journal. Use of photographs for publication and special events.
3. The spoken word: Public speaking – Microphone technique – Telephone manners.

4. Radio and other Audio media: communicating by cassettes – radio interview, discussion and other programs.
5. Film and Television: Publicity and educational use of these media – production and distribution.
6. Research in P.R: Opinion and panel research – drawing up of a questionnaire – interpreting the results.

PUBLIC RELATIONS IN ACTION.

1. The employee public: The working relationship. – Labor –management relations. – Establishing effective leadership Planned effort at P.R
2. The customer public: Need of customers – efficiency and effectiveness of customers severe – feedback and suggestion system.
3. The government public: Knowledge of and interaction with the Central Government - State Government and Municipal Governed.
4. The community public: Community opinion – community relation – open house and volunteer activities.

SPECIALISED PUBLIC RELATIONS

1. Public Relation for welfare agencies.
2. Public Relation for Health agencies.
3. Public Relation for Hospitals.
 - a. The perspective: Rising public demands – escalating costs – charitable heritages – public opinion consciousness – growing consumer movement.
 - b. The P.R. Program: Employee relations – volunteer groups – medical staff – patient – sensitivity to the press and other media.