

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS TOPICS FOR BACHELOR IN CLINICAL OPTOMETRY

First Year Term One Schedule

Topic Code		Lectures by	Number of hours Lectures	
Practical				
T 101	Human Biology	Medical faculty	75	
T 102	Basic Biochemistry	Medical faculty	50	
T 103	Physical Optics & Lighting	Physics faculty	75	
T 104	Geometric Optics	Optometric + Physics faculty	75	30
T 105	Dispensing Optics	Optometric faculty	125	120
Total hours of teaching			400	150

Pattern of Examination at end of First Terms

Paper	Name of Paper	= Topics included	Total marks	
Passing marks				
No.				
P 1	Human Biology	= T 101 + T 102	100	50
P 2	Basic Optics	= T 103 + T 104	100	50
P 3	Dispensing Optics	= T 105	100	50
Viva 1	Clinical	= T 101 + T 102	100	50
Viva 2	Technical	= T 103 + T 104	100	50
Total marks Examination			500	250

First Year Term Two

Topic Code		Lectures by	Number of hours Lectures	
Practical				
T 201	Eye Anatomy & Physiology	Medical faculty	200	25
T 202	Basic & Ocular Pharmacology	Medical faculty	50	
T 203	Pathology & Microbiology	Medical faculty	50	
T 204	Ophthalmic Optics	Optometric faculty	75	125
T 205	Computer Fundamentals	Computer Department	25	
Total hours of teaching			400	150

Pattern of Examination at end of Second Term

Paper	Name of Paper	= Topics included	Total marks	
Passing marks				
No.				
P 1	Eye Anatomy & Physiology	= T 201	100	50
P 2	Related Sciences	= T 202 + T 203	100	50
P 3	Ophthalmic Optics	= T 204	100	50
Viva 1	Eye Anatomy & Physiology	= T 201	100	50
Viva 2	Related Sciences	= T 202 + T 203	100	50
Viva 3	Ophthalmic Optics	= T 204	100	50
Total marks Examination			600	300

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Second Year Term Three

Topic Code		Lectures by	Number of hour	
			Lectures	Practical
T301	Visual Optics	Optometric faculty	100	30
T302	Dispensing Optics	Optometric faculty	100	90
T303	Optometric Instruments	Optometric faculty	75	30
T304	Optometric Instruments	Optometric faculty	50	
T305	Ocular Diseases (i)	Optometric faculty	50	
	Total hours of teaching		450	180

Pattern of Examination at end of Third Term

Paper No.	Name of Paper	= Topics included	Total marks	Passing
P 1	Visual Optics	= T301	100	50
P 2	Dispensing Optics	= T302	100	50
P 3	Eye Checkup & instruments	= T303 + T304 + T305	100	50
Viva 1	Visual Optics	= T301	100	50
Viva 2	Dispensing Optics	= T302	100	50
Viva 3	Eye Checkup & instruments	= T303 + T304 + T305	100	50
	Total marks Examination		600	300

Second Year Term Four

Topic Code		Lectures by	Number of hour	
			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
P1	Optics & Refraction	= T401	100	50
P2	Optometric Optics & LVA	= T402	100	50
P3	Eye Investigation & disease	= T403 + T404 + T405	100	50
Viva 1	Optics & Refraction	= T401	100	50
Viva 2	Optometric Optics & LVA	= T402	100	50
Viva 3	Eye Investigation & disease	= T403 + T404 + T405	100	50
	Total marks Examination		600	300

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Third Year Term Five

Topic hours Code	Lectures by	Number of	
		Lectures	Practical
T501 Contact Lenses (1) 90	Optometric faculty	100	
T502 Binocular Vision & Ocular motility 90	Optometric faculty	100	
T503 Systemic disease and the eye	Ophthalmic faculty	30	
T504 Major Eye disease 90	Ophthalmic faculty	30	
T505 Nutrition	Medical faculty	20	
T506 Public health & Com.Optometry 30	Optometry faculty	20	
Total hours of teaching		300	

Pattern of Examination at end of Fifth term

Paper marks No.	Name of = Topics included	Total marks	Passing
P 1	Contact Lenses = T501	100	50
P 2	Binocular Vision = T 502	100	50
P 3	Diseases & Optometry = T503+T504+T505+T506	100	50
Viva 1	Contact Lenses = T501	100	50
Viva 2	Binocular Vision = T 502	100	50
Viva 3	Diseases & Optometry = T503+T504+T505+T506	100	50
Total marks Examination		600	300

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 marks No.	Name of Paper = Topics included	Total marks	Passing
P 1	Contact Lenses = T601	100	50
P 2	Advanced Orthoptics = T602	100	50
P 3	Applied & Clinical Optometry = T 603 + T604	100	50
Viva 1	Contact Lenses = T601	100	50
Viva 2	Advanced Orthoptics = T602	100	50
Viva 3	Applied & Clinical Optometry = T 603 + T604	100	50
Total marks Examination		600	300

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS TOPICS FOR BACHELOR IN CLINICAL OPTOMETRY**

Fourth Year [Internship]

In specialty clinics & Optical establishments

Phase i
Phase ii
Phase iii
Phase iv

Clinical Examination (Viva + Practical)

Clinical Optometry	100
Investigative Optometry	100
Dispensing Optics & Workshop Practice	100
Total marks Examination	300

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

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) Anatomy and Physiology for nurses – 16th Ed. – Evelyn C. Pearce –Jaypee publishers
- c) Handbook of General Anatomy, 2nd Ed. B.D.CHAURASIA, CBS Publishers and Distributors, New Delhi 110 032

Lecture & Demonstration Topics:

Organisation of the body.

Basic Chemistry and some facts about biochemistry, definitions, aroma, Biomolecules, Bioenergy, Biosynthesis.

Generalisations about body structure, terms used in describing body structure Definitions and Terminology in Human Biology, Anatomy, Histology etc.

Classification of body system and tissues. Directional terms, Planes of body, abdominal regions, anatomical positions.

Generalisations about body functions, Homeostasis of body temperature.

Cell structure – Cell differences, cell membranes, Protoplast, Cytoplasm, organelles. Nucleus and special cell structures.

Cell Physiology – movement of substances through cell membranes, types of processes – Diffusion, Osmosis, Filtration, Physiological pumps, Phagocytosis and pinocytosis.

Tissues – Epithelial Locations, functions, types and generalizations.

Connective tissue – types, functions and characteristics : Muscles and Nervous tissues.

Membranes and glands – Definitions and types, mucous membranes, serous and cutaneous membranes, Skin – epidermis, dermis and accessory organs.

Glands – Composition and types.

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 change in skeleton.

Skeletal system – Articulations – meaning and functions, kinds of joints, joint age changes and diseases.

Skeletal system – Muscles – general functions, skeletal muscles organs, weak places in abdominal wall, posture – meaning how maintained, importance of body as whole.

Nervous system – Cells and nerve impulse conduction, definitions and various mechanisms

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.

Cranial nerves – structure and functions.

Somatic sensory and motor pathways, Reflexes – definitions and some somatic reflexes of clinical importance.

Automatic nervous system – definitions, structure, general principles and functions.

ANS as a whole, sympathetic and Parasympathetic divisions – functions especially ocular.

Sense organs – Classifications, structures and functions, types of pain.

Eye, Anatomy apparatus, olfactory sense organs, gustatory sense organs.

Endocrine system – meaning, prostaglandins (tissue hormones), how hormones act.

Pituitary gland – size location, component glands.

Thyroid gland – location, structure, hormone and effects.

Parathyroid - location, structure, hormone and effects.

25. Adrenal glands - location, structure, hormone and effects.

43. Islands of Langerhans – insulin, glucagons, pancreatic polypeptide.

44. Ovaries – Estrogen and progesterone Testes – Testosterone.

45. Pineal gland and Thymus – brief description and significance.

46. Blood – Volume, component cells – structure and functions, formation and life span, blood groups, plasma and coagulation – purpose, mechanism, factors affecting blood clotting.

47. Anatomy of cardio-vascular system – Heart – Location, size, structure and functions, conduction system, ECG, control of heart rate, cardiac cycle.

48. Blood vessels – kinds, structure, functions, main blood vessels.

49. Blood circulation – definitions, control of arterial blood pressure.

50. Blood circulation – how to trace – methods of study and clinical importance – especially retinal circulation.

51. Blood pressure - clinical methods of measurement, significance in ocular diseases.

52. Pulse – definition, cause, feeling the pulse, measurement and clinical significance.

26. Lymphatic system – definitions, lymph and tissue fluid, lymphatic – formation and Distribution, structure and functions, Lymph nodes – structure, locations and functions.

53. Thymus and Spleen – location, structure and function.

38. Respiratory system – general outline of structure and functions of Nose, Pharynx, Larynx, Trachea, Bronchi, Lungs

48. Physiology of respiration – pulmonary ventilation , volume of air exchanged, types of breathing, external and internal respiration, exchange of gases for cornea even under closed eye conditions.
49. Digestive system – general outline of Structure, functions of buccal cavity, salivary glands, teeth, Pharynx, esophagus, stomach, small intestine, large intestine, peritoneum, Liver, Gall bladder, pancreas.
50. Definition of digestion, purpose mechanical and chemical digestion: Absorption – definition and how accomplished.
42. Metabolism – Imported generalizations – Outline of Carbohydrates, fat, protein metabolism.
 1. Homeostasis of body temperature – Heat production and loss, heat dispensing and gaining mechanisms, control of body temperature and fever.
 2. Urinary system – Kidneys – Size, shape, location, outline of structure, functions, influence on blood pressure.
 3. Urinary system, - Ureters, Bladder, Urethras – Outline of structure, location and functions.
 4. Urine – Physical Characteristics, chemical composition, definitions, routine tests.
 5. 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)
 7. 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.
 8. Reproduction of cells – Deoxybonucieic acid (DNA), Mitosis, meiosis, Spermatogenesis Oogenesis.
 9. Male reproductive system – general outline of structures involved.
 10. Female reproductive system – general outline of main and accessory structures involved.Recurring cycles Ovulation, menstruation – regulations, clinical significance, effect on Cornea – Pregnancy and birth – breast – family planning.
 11. Sexual reproduction – meiosis
 12. Genes chromosomes, inheritance and human variations.
 13. Mutations, Authorised and sex linked inheritance.
 14. Intelligence and human society.
 15. Embryology – Meaning, steps in development of new individual.
 16. Survey of embryology, Features of the embryo – age and length relationships.
 17. General functioning of normal human body, age related changes.
 18. Immune system – Major components –Lymphocytes, antibodies (immunoglobulins), Complement, proper din, interferon, conditions involving abnormalities of immune system, Transplant rejection – Corneal transplant etc. Major diseases – Cancer, AIDS.
19. Stress definition, development concept, mechanisms, stress and disease.
20. Stress syndrome, indications of stress. Psychological stress.
21. Outline of the pathological processes inflammation, infection, edema, disease – Ulcer.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

FIRST YEAR TERM ONE

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 of 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 bill Rubin in blood. They would also learn the physico-chemical aspects of Biochemistry.

2) **Text and Reference Books**

- a) A Text book of Biochemistry – 7th Ed. – A.V.S.S. Rana Rao , - UBS Published
- b) A Text book of Biochemistry – A.C. Dev
- c) A Text book of Biochemistry – Chatterjea 2nd Ed. 2004 – Jaypee published

Lecture Topics

- 4. Hormones basic concepts in metabolic regulation with examples, insulin.
 - 5. Metabolism – General whole body metabolism (Carbohydrates, proteins, and lipids).
 - 6. Carbohydrates – Properties & tests for Glucose, fructose: galactose, lactose, sucrose: starch and glycogen.
 - 7. Proteins – Properties & tests for Amino acids, peptides, and proteins (general with a few important examples like glycine, tryptophan, glutathione, albumin).
 - 8. Lipids – Properties & tests for General with important examples like cholestrol, phospholipids, fatty acids, etc.
 - 9. Enzymes – Properties & tests for Properties, functions, co-enzymes, cofactor, apoenzyme hollow enzyme with examples like try sin, pepsin etc.
 - 1. Vitamins – Properties & tests for General with emphasis on A, B2, C, E and inositol.
 - 2. Minerals – Properties & tests for Na, k, Ca, P, Fe and Se.
 - 3. Techniques – Colloidal state, sol, gel, emulsion, dialysis, electrophoresis, pH buffers, mode of buffer action, molar and percentage solutions, photometry, colorimetry and spectrophotometry.
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- 4. Clinical Biochemistry – Blood sugar, urea, creatinine and bulrubin of their estimation .
 - 5. 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)

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BACHELOR OF OPTOMETRY (B.OPTOM)

FIRST YEAR TERM ONE

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 polarization. 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 & BRIJLAL
 - c) Fundamental of Optics : F.A. JENKINS & H.E. WHITE

Lecture topics

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 – eye'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 slit grating
- e) Reflection grating and the zone plate.

10. POLARISATION :

- a) Polarization of transverse waves – light as transverse waves.
- b) Double refraction, principal planes, Nicol prism – plane polarization

- c) Circular, elliptic polarization production, detection and behaviour.
- d) Optical activity – Fresnel’s half shade polarimeter.
- e) Polarisation by selective absorption – dichorism.
- f) Basic principles of Holography.

1. SPECTRUM :

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

2. SCATTERING :

- e) Rayleigh’s scattering
- f) Raman scattering

3. Surface tension

4. 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 – Utilization factor, depreciation factor
7. Illumination laws
8. Lighting installation – glare, luminaries, lighting fixtures, types of lighting.
9. Requirements for illuminations of work place
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 case.

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.
1. Reflection grating
2. Resolving power of a telescope
7. Spectroscope, determination of refractive index of prism
8. Thickness of thin glass plate
9. Use of telescope in small observatory

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

FIRST YEAR TERM ONE

T104 GEOMETRICAL OPTICS

1. **Scope and Objective** = The Geometric Optics is the basic 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 :**

Introduction – Lens shapes, vergences and conversion factors. Divergence and secondary focal points – predictable rays.

Spherical refracting interfaces – convex, concave, derivation of vergence equation, sagittas, dioptric power – focal points, nodal points and plane. Symmetry point imaging examples, lateral magnification.

Thin lens equation – lenses in contact separated. Two lens systems – reduced systems using vergence techniques.

Application – calculation of image points, dioptric powers in reduced systems using vergence techniques.

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 with dispersion.
 - b. Dispersion by a prism – angular dispersion – dispersion power – dispersion without deviation and deviation without dispersion. Achromatic prisms and lenses – prism diopters.
 - c. Monochromatic aberrations – first order and third order theory.
 - d. Spherical aberrations, coma, astigmatism, curvature, distortion – cause and the methods of minimizing 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 – Dispersion power – magnifying power of simple and compound microscope, t telescope.
3. Applications 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 – advances
19. Dispersion Spectra

20. Magnification and magnifiers.
21. Microscopes introductory
22. Microscopes design
23. Telescopes – History and principles
24. Telescopes – Design 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 compound microscope telescope
12. Microscope systems.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

FIRST YEAR TERM ONE

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. Spectacle Lenses – Theory and practice – Coling Fowler, Butterworth Heinemann.
 2. Ophthalmic Lenses and dispensing – M.Jalie, Butterworth Heinemann.
 3. Spectacles Lenses – Theory & Practice – Colin Fowler, Keziah Latham
 4. 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 iris.
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 and sag formula
19. Focimeter – power of lens and 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 spectacles prescription.
29. Prescription mistakes commonly made.
30. Prismatic effect of sphero-cylindrical lenses.
31. Aberrations in Ophthalmic lenses
32. Tilt induced power in spectacles 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 material – 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

Spectacles Frames – theory basics (1)

1. History of spectacles
2. Nomenclature and terminology
3. Types and Parts of spectacle frames
4. Spectacles frames – sides and joints
5. Spectacle frame bridge
6. Shapes of spectacle frames – advantages and disadvantages
7. Spectacle frame measurements and markings.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

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 the 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.

2. **Text and reference Books.**

1. Text book of Physiology – Chatterjea
2. Physiology of the eye – Adler H. – 6th edition published C.V. Mosby Company
3. Physiology & Anatomy – Arvind Eye Hospital, Madurai
4. Anatomy of eye & orbit Wolff's – 7th Ed. H.K. Lewis & Co.Ltd.,
5. Anatomy of eye & its adnexa – H.V. Nema 1st Ed.1983, Jaypee published

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 eye ball – 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 – papillary 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 – method 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, anatomic relevance, functions
24. Retina-anatomical structure, layers-significance, distribution of rods and cones
25. Difference 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 papillary 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 measurements and classification.
7. Visual Field – definition, significance, methods of examination – outline
8. Visual field defects – types, description, significance.
9. Protective mechanism 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 papillary construction.
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.

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 structures.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
 BACHELOR OF OPTOMETRY (B.OPTOM)
 FIRST YEAR TERM TWO**

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. Hand book of Pharmacology -Suman Jain 2nd Ed. Paras publishers
 - c. Text book of ocular Therapeutics - Ashok Gurg 2nd Ed. Jaypee publishers
 - d. Advanced ophthalmic diagnostic & Therapeutics – 1992 , Susan C.Benes, Jaypee publishers

Lecture Topics

1. GENERAL PHARMACOLOGY

- a. Mechanisms of drug action
- b. Dose-response relationships
- c. Tachyphylaxis and idiosyncrasy
- d. Pharmacokinetics of drug absorption, distribution, Biotransformation, excretion and toxicity.
- e. Factors influencing drug metabolism of 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
- 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 ocular penetration

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 DRUGS 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. Anesthetics
- f. Proteolytic enzymes

FIRST YEAR TERM TWO

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. Ocular Micro Biology - Dr.Savitri Sharma (Arvind Eye Institute)
 - b. Ophthalmic pathology – An atlas & text book Vol1,2 – Spencer, 1985, W.B. Saunders Co.
 - c. Ophthalmic pathology - An atlas & text book Vol1,– 2nd Ed. Hogan & Zimmerman W.B. Saunders Co.
 - d. Immunopathology of the eye – A.H.S. Rahi, A.Garner , Blackwell scientific publication
 - e. Ocular Histology – Ben S.Fine, Myron Yanoff, Medical Dep, Harper & Row published

Lecture Topics

1. Inflammation and repair
2. Infection in general
3. Specific infections
 - a. Tuberculosis
 - b. Leprosy
 - c. Syphilis
 - d. Fungal infection
 - e. Viral Chlamydia 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 student to study characteristics of bacteria. Viruses,Fungi and parasites causing diseases of all the eye.

To apply the principles of sterilization 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 Science 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) : Machie & 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 cultivating bacteria
4. Sterilization and disinfection used in laboratory and hospital practice
5. Common bacterial infections of the eye
6. Common fungal infections of the eye
7. Common viral infections of the eye
8. Common parasitic infections of the eye

T204 OPHTHALMIC 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, WHA Fincham, 9th edition, Butterworths, 1980.
 - b. Optics of human eye – Smith Etichision.

Lecture Topics

2. Introduction Vergence and vergence techniques revised. Lens power, prism power, and cylindrical lenses.
3. Gullstrand's schematic eyes, visual acuity, Stile Crawford experiment and binocular telescopes.
4. Emmetropia and ametropia
5. Correction of spherical ametropia.
6. Thin lens model of the eye – angular magnification – magnification of microscope telescope, spectacle and relative spectacle magnification.
7. Applications- to calculate the angular magnification, dioptric power of the spectacles, spectacles magnification, entrance and exit pupils, vertex distances.
8. Presbyopia.

9. Aphakia
10. Astigmatism – Applications – for e.g. To calculate the dioptric power, angular magnification of spectacles in aphakic, presbyopic patients. To calculate the position of the line image in a sphere cylindrical lens.

11. Laser optics- basic laser principles, - spontaneous and emission. Coherencespatial, temporal, laser pumping, population inversion optical feedback laser resonator stability condition. Gas lasers, and solid lasers, Helium-neon laser Argon ion laser-ruby laser. Monocular laser – carbondioxide, eximer laser. Semi conductor lasers. Lasers in medicine.
12. Holography
13. Spatial distribution of optical information- modulation transfer functions- Spatial filtering – applications.

GEOMETRICAL OPTICS II PRACTICALS

1. Spectrometer – minimum deviation and narrow angled prism
2. Focimeter and neutralization 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 E-mail and internet to the 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
1. Use of specialized software for Optometric use.

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 the course is to prepare the candidate through didactic lecture which he is expected to translate into practice at the clinics.
2. **Text and reference books** =
 - a. Optics and Refraction – L.P.Aggarwal
 - b. Principles of Optics and Refraction – Duke Elder
 - c. Optics & Refraction – A.K. Khuara
 - d. Visual Optics and Refraction – A clinical approach DAVID D.MICHAELS. The C.V.Mosby & Co. 1985.
 - e. Principal & Practice of Refraction – N.C.Singhal

Lecture Topics

Review Of Geometrical Optics

1. Vergence and power
2. Sign convention
3. Spherical refracting surface
4. Spherical mirror; catoptric power
5. Cardinal points
6. Magnification

Optics Of Ocular Structure

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 Cause

1. Aetiology of refractive anomalies
2. Contributing variabilites 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 emplitude
- b. Methods of measurement of Accommodation

- c. Near point of convergence of significance
- d.. Methods of measurements 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 methods for astigmatism
- k. Difficulties in subjective tests and their avoidance
- l. Transposition of lenses
- m. Spherical equivalent.

Optometric Optics Practical Demonstrations

Visual acuity, stereo acuity in emmetropia

Myopia and pseudomyopia, myopia and visual acuity

Measurement of accommodation: near and far points and range

Measurement of Convergence – near point and adduction and abduction range

Practice of retinoscopy – Emmetropia

Practice of retinoscopy - spherical ametropia

Practice of retinoscopy – simple astigmatism

Practice of retinoscopy – compound hyperopia

Practice of retinoscopy – compound myopia

Practice of retinoscopy – oblique astigmatism

Practice of retinoscopy – media opacities

Practice of retinoscopy – in irregular astigmatism

Interpretation of cycloplegic retinoscopic findings

BACHELOR OF OPTOMETRY (B.OPTOM)
SECOND YEAR TERM THREE

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 into 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 patients.

2. **Text and reference books** =
 - a. Principles of Ophthalmic Lenses : M.JALIE
 - b. Spectacle Lenses : Theory & Practice – Colin Fowler & Keziah Latham
 - c. 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 workshop
3. Ophthalmic raw materials – history and general outline
4. ISI Standars for lenses
5. Manufacturing of Ophthalmic blanks – Plastics
6. Plastic lenses – materials 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. Unusual Lens forms
12. Faults in lenses – description
13. Faults in lenses – detection

Types of Ophthalmic lenses

Aspheric lenses
High index lenses
Bifocal and multifocal lenses – types and characteristics.
Bifocal and multifocal lenses - purposes and choice
Photo chromic lenses
Polaroid lenses
Tinted lenses – absorptive properties
Tinted lenses – examples and discussions

Special purpose lenses.

Spectacle Frames – theory basics (1)

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 shops (II)

1. Dispensing counter organization
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. Measurement 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, handing and correction
21. Repairs to spectacles – Soldering, rivets for metal plastics frames
22. Special types of spectacles and appliances
23. Monocells and Ptosis crutches

SECOND YEAR TERM THREE

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. Basic Ophthalmology - Renu Jogi 3rd Ed., Jaypee published
 - b. Parson's Diseases of the eye – Ramanjit Sihota. Radhika Tandon 20th Ed. Elsvier Pvt. Ltd.
 - k. Low Vision Aids – Monica Chaudhry 2006 Jaypee published
 - l. Practical Manual of Ophthalmology – Vinod Lohiya 2006, Jaypee published
 - e. Basic Ophthalmology – Basak

Lecture Topics

1. Binocular Vision
2. Refractive Instruments
 - a. Test charts standards
 - b. Choice of test charts
 - c. Trial case lenses
 - d. Refractor (phoropter) head units
 - e. Optical considerations of refractor units
 - f. Trial frame design
 - g. Near vision difficulties with units and trial frames
 - h. Retinoscope – types available
 - i. Adjustment of Retinoscope – special features
 - j. Cylinder retinoscopy
 - k. Objective optometers
 - l. Coincidence optometers-principals and details
 - m. Infrared optometer devices
 - n. The interpretation of objective findings
 - o. Special subjective test polarizing and displacement etc.
 - 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. Ophthalmoscopes disc
 - d. Filters for ophthalmoscopes
 - e. Indirect ophthalmoscopes
 - f. The use of ophthalmoscopes 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 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 Keratotomy
 - 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 visual field
 - b. Campimeters and 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

SECOND YEAR TERM THREE

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 students should also become familiar with certain diagnosis treatments like visual fields, macular function test, etc. to confirm the clinical findings are 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 Machie, Butterworth Heinemann
 - d. Clinical Examination of Ophthalmic cases – M.L.Aggarwal & L.C.Gupta, CBS Publish Delhi.
 - e. Clinical Ophthalmology, Jack K.Kanski, Butterworth, 2nd edition 1989.
 - f. Basic and Clinical Sciences – American Optometric Association.
 - g. Clinical Procedure 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.

Slit Lamp examination

- a. Examination of eye lids, conjunctive 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) choroids 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.

SECOND YEAR TERM THREE

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 method of examination in various sub-specialties of Ophthalmology.
2. **Text and reference books** =
 - a. Parsons Diseases of the eye, Ramanjit Sihota, Radhika Tondon. 20th Ed. Elsevier. Pvt.Ltd.
 - b. Clinical Ophthalmology – JACK J.KANSKI, 2ND Ed. , 1989 Butterworths.
 - c. Modern Ophthalmology – L.C.Dutta 3rd Ed., Jaypee publishers.
 - d. Ophthalmology for undergraduate students – M.L Agrawal, L.C. Gupta, Sanjeev Agarwal - Jaypee published 1st Ed.
 - c. Text book of ophthalmology – H.V. Nema 4th Ed., Jaypee publishers.
 - f. Basic Ophthalmology – Renu Jogi Jaypee publishers.

Lecture Topics

EYELIDS

- a. Eyelid anatomy
- b. .Congenital and developmental anomalies
- c. Blepharospasm
- d. .Ectropion
- e. Entropion
- f. Trichiasis and symblepharon
- g. Eyelid inflammations
- h. Eyelid tumors
- i. Ptosis
- j. Eyelid retraction
- k. Eyelid trauma

LACRIMAL SYSTEM

- a. Lacrimal anatomy
- b. Lacrimal pump
- c. Methods of lacrimal evaluation
- d. Congenital and development anomalies of the lacrimal system
- e. Lacrimal obstruction
- f. Lacrimal sac tumors
- g. .Lacrimal trauma

SCLERA, EPISCLERA.

- a. Ectasia and staphyloma
- b. Scleritis and episcleritis

ORBIT

- a. Orbital anatomy
- b. Incidence of orbital abnormalities
- c. Methods of orbital examination
- d. Congenital and developmental anomalies of the orbit
- e. Orbital tumors
- f. Orbital inflammation
- g. Sinus disorders affecting the orbit
- h. Orbital trauma

CONJUNCTIVA AND CORNEA

- a. Inflammation
- b.1. Therapeutic principles,
2. Specific inflammatory diseases
- c. Tumors
 1. Tumors of epithelial origin
 2. Glandular and adenexa tumors
 3. Tumors of neuroectodermal origin
 4. Vascular Tumors
 5. Xanthomatous origin
 6. Inflammatory tumors
 7. Metastatic lesions
- d. Degeneration and dystrophies
 1. Definition
 2. Degeneration's
 3. Dystrophies
- e. Miscellaneous conditions
 1. Keratoconjunctivitis Sicca (K-Sicca)
 2. Tear function tests
 3. Steven 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

IRIS, CILIARY BODY AND PUPIL

- a. Congenital anomalies

- b. Primary and secondary disease of the iris and ciliary body
- c. Tumors
- d. Anomalies of pupillary reaction

7. CHOROID

- a. Congenital anomalies of the choroid
- b. Diseases of the choroid
- c. Tumors

T401 OPTICS & REFRACTION

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 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. Principle of Ophthalmic Dispensing : M.JALIE
 - b. Spectacle Lens Theory & Practice – COLIN FOWLER

Lecture Topics

- 1.a. Tinted and protective lenses
 - b. Characteristics of tinted lenses
 - c. Absorptive glasses
 - d. Polarizing filters
 - e. Photochromaic 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 present prisms
 - c. Reflections from spectacle lenses, ghost images reflection in bifocals at the dividing line.
 - d. Anti-reflection coating
 - e. Field of the view of the lenses.
 - f. Size, shape and mountings of the ophthalmic lenses

Effective power of spectacles, vertex distance effects

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 & Refraction = A.K.KHURANA
 - c. Clinical optics – BUDD APPLETON
 - e. Low vision Aids – MONIKA CHAUDHRY

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. Rational 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 ophthalmic phakometry
 - d. Axial and axis of the eye
 - e. Far and Near Point of Accommodation
 - f. Subjective Methods of refractions
 - 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 and monocular and binocular
4. Hypermetropia – determination of manifest error subjectively
5. Hypermetropio 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-cyl. Subjective verification tests.
9. Measurement of accommodation: near and far points and range
10. Presbyopic correction and methods: accommodative reserve, balancing the relative accommodation and cross grid cylinder 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

Scope and Objective – Patient 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 Specific of Optometrists.

Text Book & Reference Books

- a. Low Vision Aids – MONIKA CHAUDHRY

Lecture Topics:

1. Identifying a low vision patient
2. History
3. Refraction
4. Evaluation of near vision Amsler grid and the field defects
5. Demonstrating aids
6. Teaching the patient to use aids
7. Guide to selected low vision aids
8. Fitting spectacles telescope and glasses
9. Children with low vision
10. Effects of the eye condition of functional vision
11. Light, glare and contrast in low vision care rehabilitation
12. Diagnostic procedutes in low vision care management
13. Optics of low vision aids
14. Bioptic telescopes
15. Optical devices that help people with field defects

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
BACHELOR OF OPTOMETRY (B.OPTOM)
SECOND YEAR TERM FOUR**

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 focuses 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. Parsons Diseases of the eye, Ramanjit Sihota, Radhika Tondon. 20th Ed. Elsevier. Pvt.Ltd.
 - b. Clinical Ophthalmology – JACK J.KANSKI, 2ND Ed. , 1989 Butterworths.
 - c. Modern Ophthalmology – L.C.Dutta 3rd Ed., Jaypee published.
 - d. Ophthalmology for undergraduate students – M.L Agrawal, L.C. Gupta, Sanjeev Agarwal Jaypee published 1st Ed.
 - e. Text book of ophthalmology – H.V. Nema 4th Ed., Jaypee published
 - f. Basic Ophthalmology – Renu Jogi Jaypee published

Lecture Topics

1. **VITREOUS**
 - a. Developmental abnormalities
 - b. Hereditary hyaloidoretinopathies
 - Juvenile retinoschisis
 - Asteroid hyalosis
 - Cholestrolosis
 - e. Vitreous hemorrhage
 - Blunt trauma and vitreous
 - Inflammation and vitreous
 - Parasitic infestations
 - Pigment granules in the vitreous
 - f. Vitreous complications in cataract surgery
2. **RETINA**
 - a. Retinal vascular anomalies
 - b. Diseases of the choroidal vasculature, Bruch's membrane, and retina pigment epithelium (RPE)
 - c. Retinal tumors 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 degeneration
 - h. Retinal holes and detachments
 - i. Intraocular foreign bodies
 - j. Photocoagulation
3. **NEURO-OPHTHALMOLOGY**

- . Neuro – ophthalmic examination
 1. History & Visual function test
 2. Technique of pupillary examination
 3. Ocular motility
 4. Checklist for testing

- . 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 system

- . 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
 - g. Selected system disorders with neuro-ophthalmologic signs

4. **LENS**

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 therapy

- b. Drug induced ocular disease.

SECOND YEAR TERM FOUR

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. Electro 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 / Potential 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 and attachments
19. Goinoscopy
20. Pachymetry
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. Ophthalmoscopy
27. Retinoscopy
28. Auto-Refractometry
29. Keratometry
30. Ophthalmic Lens Measuring Instruments

SECOND YEAR TERM FOUR

T405 HOSPITAL PROCEDURES AND MEDICAL PSYCHOLOGY HOSPITAL PROCEDURES

Lecture Topics.

1. Administration
2. Medical Records department
3. Reception
4. Computer Section – appointment scheduling, accounts
5. Laboratory – all investigations performed
6. Correspondence
7. 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 – it's 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 (1)

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 – MONTAGUE RUBEN

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 Cornea; 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 finalizing of Contact Lens parameters
23. Ordering Rigid verifying Contact Lens – writing a prescription to the Laboratory.
24. Checking and verifying Contact Lens 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.

THIRD YEAR TERM FIVE

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**
 - . Ocular Motility - VIRGINIA CARLSON HANSEN
 - . Practical Orthoptics in the treatment of the squint – T. KETHLYLE & KANETH W.HYPER
 - . Handbook of Orthoptics principles = G.T. Wilonghby Cashell, Isobel Durran, Churchill Living stone.

Lecture Topics

General introduction

Binocular vision and space perception development

- a. Fusion, diplopia, correspondence
- b. Stereopsis, Panum's area. BSV
- c. Stereopsis and monocular due - 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

Summary of Anatomy of Extra Ocular Muscles

Rectli and Obliques, PLS

Innervation & Blood supply

Physiology of Ocular movements

Center of rotation, Axes of Fick

Action of individual muscle

Laws of ocular motility

Donder's and Listing's law

Sherrington's law

Hering's law

Uniocular & Binocular movements – fixation, saccadic & pursuits

Version & Vengence

Fixation & field of fixation

Nystagmus

Near vision complex

- a) Accommodation
- i) Definition and mechanism (process)
- ii) Methods of measurement

Stimulus and innervations

Types of accommodations

Anomalies of accommodation – aetiology and management

- a) Convergence

Definition and mechanism

- ii) Methods of measurement

- iii) Types and components of convergence – Tonic, accommodative fusional proximal

- i) Anomalies of Convergence – aetiology and management

Pupillary Construction

- a) Relation to Accommodation and convergence

- b) Physiologic significance

- c) Reaction to fusion

Visual Acuity

Definition and basic concepts

Factors of affecting visual acuity

Optical effects of spectacles

Aniseikonia

Sensory adaptations

Confusion

Suppression

Abnormal Retinal Correspondence

Blind spot syndrome

Amblyopia

- a. Definition and types

- b. Investigations

- c. Management

BACHELOR OF OPTOMETRY (B.OPTOM)

THIRD YEAR TERM FIVE

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 the patho-physiology of the diseases, 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. Parson's Diseases of the eye – Stephen J.H.Miller, 17th edition, Churchill Livingstone.
 - b. Clinical Ophthalmology – Jack Kanski (JKK), 1st edition, Butterworths
 - c. Principles and practice of ophthalmology – Vol.1& 3 – Peyman, Sanders, Goldberg Jaypee publishers 1st Ed.
 - d. System of ophthalmology Vo. XV- Sir Stewart Duke Elder 1976, Henry Kimpton – London.
 - e. Modern Ophthalmology – Arnold Sorsby , systemic aspects – Vol 2. 2nd Ed. 1977 R.J. Acford Ltd.

Lecture Topics

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

- Anatomy and physiology of thyroid gland, Classification of thyroid disease.
 - Diagnosis, complications, clinical features, management, thyroid disease of the eye
7. TUBERCULOSIS
- Etiology, pathology, clinical feature, pulmonary tuberculosis, diagnosis, complications, treatment, tuberculosis and the eye
8. HELMINTHIASIS
- Classification of helminthic disease, schistosomiasis, principles of diagnosis and management.
 - Helminthic disease and the eye (Taenia, echinococcus, larvae migrans)
9. COMMON TROPICAL ILLS, (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. INTRODUCTION 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 and patho-physiology
 - Disseminated sclerosis, subacute combined degeneration
 - Eye and connective tissue disease.
13. GENERAL, MEDICAL EMERGENCIES – FIRST AID
- Ocular and first aid
14. GENETICS
- Introduction to genetics
 - Organisation 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 engineering

**BACHELOR OF OPTOMETRY (B.OPTOM)
THIRD YEAR TERM FIVE**

T504 MAJOR EYE DISEASES

1. **Scope and Objective** = To learn in details of the etiology, differential diagnosis, 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 eye in private clinic. Points about urgent, emergency and routine referral of patients 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 – Kanski, Salim, Butterworth Heinemann
 - d. The Glaucoma handbook – Anthony Litwak, Butterworth Heinemann
 - e. Macular Disorders – Anthony Cavallerano, Butterworth Heinemann

Lecture Topics

Cataract
Glaucoma
Retinal detachment
Cornea ulcer & opacities
Visual loss – ophthalmic lesion
Diabetic Retinopathy
Macular degeneration
Chemical burns

**BACHELOR OF OPTOMETRY (B.OPTOM)
THIRD YEAR TERM FIVE**

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. Lawrence 1988.
 - b. Introductory nutrition : Helen A.Guthine – 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.

ENERGY

Units of energy, Measurement and energy value of food, Energy expenditure Total energy / calorie requirement for different age groups and disease
Satiety value, Energy imbalance – obesity, starvation

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.

FATS

Functions and sources, Essential fatty acids, Excess and deficiency, Lipids and the eye Hyperlipidemia, Heart diseases, atherosclerosis.

MINERALS

General functions and sources, Macro and micro minerals associated with the eye deficiencies and excess ophthalmic complications (eg.) iron, calcium, iodine, etc.,

VITAMINS

General functions food sources, vitamin deficiencies and associated eye disorders with particular emphasis on vitamin 'A'.

MISCELLANEOUS

Measles and associated eye disorders, low birth weight.

BACHELOR OF OPTOMETRY (B.OPTOM)

THIRD YEAR TERM FIVE

T506 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.1 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 Pitts - Butterworth Heinemann
 - f. Work and the eye – Richard 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 Bergley - Butterworth Heinemann

Lecturer Topics

1. **PHYLOSOPHY OF PUBLIC HEALTH**
 -) History of public health
 -) History of public health optometry (including epidemiology, manpower, projections, community reimbursement mechanisms)
1. **HEALTH CARE SYSTEMS**
 -) Organisations of health services (principles of primary, secondary and tertiary care)
 -) Detriments of health care delivery system
 -) Planning of health services (including relevant legislation and implications to optometric practice)
 -) Health economics
 -) Health manpower protection and in the practice of ophthalmology
 -) Third party involvement in financing health care services (including both governmental and non governmental programme)
- g) Quality assurance
2. **MODES OF HEALTH AND VISION CARE DELIVERY**
 -) Solo and group practice modes
 -) Multidisciplinary and institutional practice modes
 -) Optometry's role as a primary care profession

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

**BACHELOR OF OPTOMETRY (B.OPTOM)
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. Contact Lenses Practice – MONTAGUE RUBBEN

Lecturer Topics

Soft contact lens – Law materials, classification, terminology, etc.
Manufacturing Soft Contact Lenses –various methods- advantages & disadvantages
Various designs Soft Contact Lenses - advantages & disadvantages
Pre- Fitting examination – steps, significance, recording of result
Special points for in pre-fitting examination of Soft Contact Lenses
Discussion with patient choice of lens – type
Fitting Soft Contact Lenses general outline
Fitting Soft Contact Lenses – methods –Trial set method
Using trial lenses . calculations involved
Fitting Soft Contact Lenses methods first fit method
Methods of assessment of Soft Contact Lenses fit.
Types of fit – steep , Flat, Optimum – on spherical cornea
Types of fit – steep , Flat, Optimum – on Toric cornea with spherical lenses
Types of fit – steep , Flat, Optimum – on Toric cornea with toric lenses
Calculation and finalizing of Soft Contact Lenses parameters
Ordering Soft Contact Lenses – writing a prescription to the Laboratory
Fitting Soft Contact Lenses from stock – advantages, limitations, precautions
Checking and verifying Soft Contact Lenses
Components of Lens care systems for Soft Contact Lenses
Contact lens solutions – composition, necessity, advantages
Teaching the patient to insert and remove soft lenses
Common handling instruction to first time wearers
Special instructions to the patient for using soft lenses
Special soft lenses – cosmetics, Disposable , Toric
Special Rigid Lenses and designs – Toric, Keratoconus, etc.
Special considerations for fitting Contact Lenses, - Children, irregular cornea, Univocal
Aphakia, sports one eyes patients post RK, post PRK
Ortho – keratology and myopia
Fitting Bifocal and multifocal – RGP & Soft lenses
After care and follow up for all Contact Lens patients.
Patient Problems – identification, differential diagnosis and management

BACHELOR OF OPTOMETRY (B.OPTOM)

THIRD YEAR TERM SIX

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 basic of Orthoptics included in the theory, form the background for the student to understand binocular vision and ocular motility disorders.
2. **Text and reference books**
 - a. Ocular motility = VIRGUNIA CARLSON HANSAN
 - b. Practicle Orthoptics in the treatment of a squint = KETHLYLE & KENNTNTH WYPER
 - c. Handbook of Orthoptic principles – G.T.Willonghby Cashell, Isobel Durran Churchill Livingstone.

Lecturer Topics

Orthoptic check up and special instruments

- a. Routine Orthoptic examination
- b. Special Orthoptic investigation
- c. Instruments used in Orthoptics
- d. Diagnosis, prognosis & management methodologies

Neuro muscular anomalies

- a. Classification
- b. Hetrophoria & hetrotopia
- c. Orthophoria
- d. Concomitant & non concomitant
- e. Paralytic squint

Aetiology

Factors responsible

Role of accommodation & convergence

Genetics and occurrence of squint and binocular vision problems.

Outline of Routine Orthoptics examination

Subjective symptoms – description and significance

History – recording and significance

Measurement of angles of deviation

Sensory signs of patients

Clinical picture of types of squint

-) Accommodative
-) Intermittent
-) Altemate
-) A & V. Phenomenon

Paralytic squint

Special forms of squint

BACHELOR OF OPTOMETRY (B.OPTOM)

THIRD YEAR TERM SIX

T603 APPLIED & CLINICAL OPTOMETRY

Pediatric Optometry

1. **Scope and Objective** = The scope of the 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. Pediatric Neuro-ophthalmology – Robert Tomsak - Butterworth Heinemann
 - f. Vision Problems in childhood – Terry Buckingham, Butterworth Heinemann

Lecturer Topics

0. History - Genetic factors, Prenatal factors, Perinatal factors, Postnatal factors
2. Measurement of visual acuity
3. Normal appearance, pathology and structural anomalies of:
4. Orbit, Eyelids, Lacrimal system, Conjunctiva, Cornea, Sclera
5. Anterior chamber, uveal tract, pupils
6. Lens, vitreous, fundus
7. Oculomotor system
8. Measurement of the refractive system
9. Determining binocular status
10. Determining sensory motor adaptability
11. Compensatory treatment and remedial therapy for
12. Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia.
13. Remedial and compensatory treatment for 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, NY 1985.
 - c. IES Lighting Education introductory lighting (LE) 1985, IES Publication N.Y. 1985
 - d. Guide to Occupational and other Visual needs – HOLMES C. JOLLIES H. & GREGG J. 1958.
 - e. Occupational eye diseases and injuries – JOSEPH MINTON, William Heineann Medical Book Ltd., 1949.
 - f. Environmental Vision – Donald Pitts - Butterworth Heinemann
 - g. Work and the eye – Rachel North - 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

Lecturer Topics

1. Introduction to occupational health, hygiene and safety International Bodies like ILO, WHO, National bodies like Labor institutes, National institute of occupational health, National Safety Council etc.
2. Acts and Rules
 Factories Act, and Rules
 Workmen's compensation
 ESI Act, etc.
3. Occupational diseases/occupational related diseases caused by-physical agents, chemical agents and biological agents
4. Occupational hygiene, environmental monitoring, Recognition, evaluation, control of hazards.
 Illumination – definition, measurements, standards.
5. Occupational safety.
 Causes of accidents. Vision, Lighting, color and their role.
 Accident analysis. Accident prevention
6. Ocular and visual problems of occupation
 Electromagnetic radiation
 Ionising Non-ionising-infrared, Ultra violet, Microwave laser
 Injuries-mechanical, 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 and use
Testing for standards

Standards

Visual standards for jobs.

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 the 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.ROSSENBLUM Jr. & M.W.MORGAN, Butterworth Heinemann 1993.
 - c. Clinical Geriatric Eye Care – Sheree Aston, Joseph Maino- Butterworth Heinemann
 - d. Clinical Decision making in Optometry – Eileen Ettinger, Michael Rouse, Butterworth Heinemann

Lecturer Topics

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

THIRD YEAR TERM SIX

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 of 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

Lecturer Topics

1. Various laws governing medical and para medical profession 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 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

0. Library reference to legal documents
0. Perusal of specimens of balance sheet and account
0. Visit to varied types of firms to view organization and methods
0. Visits to office of optical organization
0. 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
3. International Optometry – important foreign optometry law
4. The optometrist in court
5. Malpractice –theory of liability- damages-minimizing malpractice claim

6. Insurance & Negligence
7. Ethics – professional ethics
8. Laws governing practice of medical profession and paramedical profession in India
9. Registered medical practitioner – laws against practice of medicine of those unregistered – Medical council of India-Dental council of India-Nursing council
11. Present rules and regulations – Laws regarding optical products manufacturers – dispensing in India.
12. Opticians – Are they registered? Dispensing Opticians – Rules in U.K.

BACHELOR OF OPTOMETRY (B.OPTOM)

THIRD YEAR TERM SIX

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, sale 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 PR – Image building, promotion of product or services, better employee, government and community relations.

METHODS OF PUBLIC RELATIONS

1. Press Relations: 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, color, and design-knowledge, of topography and layouts-direct mails, publicity material and house journal. Use of photographs for publications and special events.
3. The spoken word: Public speaking-microphone techniques

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-labour management relations- Establishing effective leadership-high cost of breakdowns and alienation-planned effort at P.R.
2. The customer public: Needs of customers-efficiency and effectiveness of Customer service-feedback and suggestion system.
3. The government public: Knowledge has and interaction with the central government-state government and municipal government.
4. The community public: Community opinion-community relations-open house and volunteer activities

SPECIALISED PUBLIC RELATIONS

1. Public relations for welfare agencies
2. Public relations for health agencies
3. Public relations for hospitals
4. The perspective: rising demands-escalating costs-charitable heritage-public opinion consciousness-growing consumer movement
5. The P.R. program, employee relations –volunteer groups-medical staff, patients sensitivity to the press and other media.