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 No.	Name of Paper	= Topics included	Total marks	Passing marks
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 Pharma-Cology	Medical faculty	50	
T 203	Pathology & Microbilogy	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 No.	Name of Paper	= Topics included	Total marks	Passing marks
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

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, Protoptasm, 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 skill 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 conductions, 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 Lange Hans – 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, contact 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 – Deoxynbonucieic 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 choresterol, 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 spectrophotometery.

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)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

BACHELOR OF OPTOMETRY (B.OPTOM)

FIRST YEAR TERM ONE

T103 PHYSICIAL 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 this 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 tranverese waves – light as transverse waves.
b) Double refraction, principal plans, 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 intra 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 – Luminious 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. Spectoscope, 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 prims 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, Shawows, 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 sixes 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 Opthalmic 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 Aspeherical
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 Wollf'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 chaisma, Lateral geneculate bodu. 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 – Emetropia 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 & Therapeautics – 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.Stimuiants 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 pharaceuticals
    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. Parasympatholylics
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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
BACHELOR OF OPTOMETRY (B.OPTOM)
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, aetilogical causes and the changes seen in the tissues and particulary 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 atlus & text book Vol1,2 – Spencer, 985, W.B. Saunders Co.
c. Ophthalmic pathology - An atlus & text book Vo1,– 2nd Ed. Hogan & Zimmerman W.B. Saunders Co.
d. Imunopahtology 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 differetiation
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

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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 ammetropia.
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 dioptoric 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.

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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 optometrise 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.