Bachelor of Science (B.Sc.)

OPTOMETRY

INTRODUCTION :

Optometry course is an independent speciality course focusing on ocular disorder, vision care and medical treatment.

An optometrist is a qualified institutionally trained, to examine the refractive errors and ocular diseases and to manage primary eye care .They can prescribe spectacles ,contact lens, low vision aids and detect the ocular diseases . They are also involved in vision therapy exercises and rehabilitation of the various conditions related to vision .They can council the patients with partial sight and hereditary vision defects.

According to the **World Council of Optometry** , the supreme governing body, “Optometry is a health care professional that is autonomous, educated and regulated (licensed/registered) and they are primary health care practitioners of the eye and visual system to provide comprehensive healthcare which includes refraction and dispensing of spectacles, detection and diagnosis of the eye disease and rehabilitation of visual system’’ .

The curriculum has been designed after a detailed evaluation of the pattern followed by different schools of optometry and considering the current eye care needs of India.

GOALS OF THE PROGRAM :

The institution mission of excellence in health care has been incorporated into the optometry syllabus .This concentrates on primary eye care, scholarly activity and development of leaders for the professional and community at laye.

By successful completion of the optometry Bachelors program students will be able to correct refraction errors.

- Correct refractive errors and prescribe glasses
- Design and dispense of contact lenses
- Assess subjects with low vision and dispense appropriate aids
- Perform comprehensive evaluation of the health status of eye and visual system and detect ocular ,associated systematic and neurological disorders and referral of patients to the specialists at appropriate stage
- Utilize the latest technology in the diagnosis of ocular anomalies including visual field devices ,imaging technology including ultrasound and retinal imaging techniques, corneal topography, Electrophysiology ,etc
- Diagnosis and orthoptic treatment of heterophoria and strabismus
- Practices of public health and community optometry in schools ,colleges ,urban and rural areas
- Do optometric counselling to the patients with hereditary visual defects
- Perform continuing professional education and uphold legal and ethical behaviour in his/her career

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Title of the program	Bachelor of Optometry
Duration	Three years of Academic program and One year of internship
Mode of study	Full Time program
Validating body	KAHER, University, Belagavi

FIRST YEAR B. OPT. SYLLABUS

(1st Semester of B. OPT.)

- Physical Optics
- Geometrical Optics
- General Anatomy & Ocular Anatomy

(2nd Semester of B. OPT.)

- General Physiology & ocular Physiology
- General Biochemistry & Ocular Biochemistry

1ST SEMESTER OF B. OPT.

PHYSICAL OPTICS (THEORY)

SL. NO.	TOPICS	HOURS
1.	Nature of light – An overview: Corpuscular Theory, Wave Theory, quantum theory and dual nature.	03
	Review – SHM, combination of two SHMs (along a line and at right angles0, energy of SHM, mathematical representation of wave, wave fronts, path and phase difference	05
	Interference of light – Superposition of two coherent waves, constructive and destructive interference, reflection phase shifts, condition for sustained interference practical methods of producing coherent eaves, theory of interference pattern and application to measurement of wavelength	10
	Interference in thin films: Films of uniform thickness, variable thickness (air wedge, Newton's rings, Michel son's interferometer), their applications to antireflection coatings, optical flatness of reflecting surfaces, determination of wavelength refractive index, thickness of thin films, radius of curvature	12
2.	Diffraction – classes of diffraction. Fresnel theory of half period zones, explanation of rectilinear propagation of light, Zone plate, comparision with a lens. Fresnel diffraction at a circular aperture.	08
	Fraunhofer diffraction at a single slit (quantitative), multiple slites and diffraction granting. General equation of granting – special cases of normal incidence and minimum deviation positions. Resolving and dispersive powers of gratings	10
3.	Polarization – Review of light as a transverse wave. Polarization phenomenon due to reflection, refraction and scattering Brewster's and Malus' laws. Polaroids. Double refraction, retardation plates, Nicol prism as a device to produce polarized light, dichroism, equation to polarization ellipse, elliptical, circular and linear polarizations, their production and detection Optical activity. Lorentz half shade polarimeter, determination of specific rotation	14
4.	Radiometry and Photometry – Terms and units Lummer – Brodhun photometer, comparison of luminous pointances (luminous intensities), determination of reflection and transmission coefficients	08
5.	Scattering of light Rayleigh scattering, Mie scattering, Raman scattering, Numericals	07
		75 Hrs

PHYSICAL OPTICS – PRACTICAL

Sl.No	TOPICS	ROUNDS
1.	EXPERIMENTS 1. Air wedge 2. Newton's rings 3. Biprism 4. Michelson's interferometer 5. Refractive index of a liquid using a hollow prism 6. Refractive indices of an anisotropic crystal 7. Variation of refractive index with wavelength 8. Diffraction grating- minimum deviation method 9. Diffraction grating – normal indication method 10. Resolving power of a telescope 11. Polarimeter 12. Verification of inverse square law of radiation using a photometer 13. Photometer – determination of transmission confficient 14. Photo diode characteristics 15. Ultrasonic interferometer	65
2.	DEMONSTRATION EXPERIMENTS 1. Single slit diffraction 2. Lassajous figures	
		65 Hrs

RECOMMENDED BOOKS

1. Fundamentals of Optics – 4th edition – francis.A.Jenskins and Harvey.E.White
2. A textbook of Optics-N.Subrahmanyam and Brij Lal
3. Optics – 4th edition – Eugene Hecht
4. Introduction to classical and modern optics – 2nd edition –Jurgen.R.Meyer – Arendt
5. Introduction to optics –Frank.L.Pedrotti and Leno.S.Pedrotti.
6. Optics – 11th edition – M.H.Freeman, C.C.Hull

GEOMETRICAL OPTICS - THEORY

SL.NO.	TOPICS	HOURS
1.	Introduction- classification of optics based on the nature and properties of light	01
2.	Review of geometrical optics – ray, beam, rectilinear propagation of light, umbra, penumbra, pinhole camera, Fermat's principle and Laws of reflection and refraction image, principal of reversibility, Conjugate points, path length, vergence, total internal reflection	03
3.	Prisms – Reflection through prism, dispersion, dispersing prisms, dispersion without deviation, deviation without dispersion, ophthalmic prisms, reflecting prisms.	05
4.	refraction at a spherical surface – focal points, focal lengths, vergence and refractive power, sign convention. image formation: predictable rays, graphical methods (both parallel and oblique ray methods) Gauss formula and surface power equations	08
5.	Thin lenses – meaning, focal lengths and power, image formation (both parallel ray and oblique ray methods), lateral axial and angular magnifications lens equations: Guess : Newton's and lensmaker's formula. Lenses in combination (with contact and without Contact), Determination focal length – for convex lens. uv method, Bassel's method and using lensometer Determination focal length- for convex lens: uv method, Bassel's method and using lensometer. Determination of focal length for concave lens using a convex lens (with contact and without contact) Determination of radius of curvature of lenses. Gradient index lenses	10
6.	Thick lenses – Meaning, focal points and principal points, image formation (both parallel and oblique ray methods). Equivalent power, front and back vertex power, nodal points and optical centre, Matrix theory	08
7.	Spherical mirrors – focal points, focal lengths, image formation, mirrors and vergence, reflection matrix, aspheric mirrors	05
8.	Aberrations – Monachromatic: spherical, coma, astigmatism (both oblique and axial) curvature of field and distortion. Chromatic aberration	08

9.	Aperture and stops – Aperture stop, depth of focus and field, field stop, field of view, pupils stop between two lenses, two lenses with no stop	06
10.	Optical system – Camera lenses. The eyes and its refractive anomalies, microscopes, telescopes, eyepieces, catoptric and catadioptric system	06
11	Quantum optics – Photolelctric effect, sources of light, spectrum (both emission and absorption	06
12	Optical fibres- types, ray propagation,losses, applications and brief introduction to integrated optics	05
13	Lasers – basic principles and working. Ruby, He-Ne, Argon ion, carban dioxide, excimer and semiconductor lasers	06
14	Optics of transformations – Fourier transforms spectroscop, transfer functions and optical data processing.	08
		85 Hrs

GEOMETRICAL OPTICS – PRACTICAL

SL NO	TOPICS	HOURS
1.	1. Law of reflection 2. Law of refration 3. Critical angle of glass 4. Angle of minimum deviation using I-d curve 5. F & u of convex lens 6. F & u of concave lens 7. F & f convex mirror 8. F of concave mirror 9. U of solid 10. U of liquid 11. Angle of the prism – using spectrometer 12. Determination of Cauchy's constant 13. U of the material of the crown and flint glasses for Na light 14. Dispersive power of a prism 15. Planck's constsnt	65
2	Demonstration equipments 1. Magnification of a compound Microscope 2. Reflecting prisms	
		65 Hrs

RECOMMENDED BOOKS

1. Fundamentals of Optics – 4th edition – Francis A Jenskins and Harvery & White
2. A textbook of Optics – N Subrahmanyam and Brij Lal
3. Optics – 4th edition – Eugene Hecht
4. Introduction to classical and modern optics – 2nd edition – Jurgen R Meyer – Arendt
5. Introduction to optics – Frank L. Pedrotti and Leno S. Pedrotti
6. Optics – 11th edition – M. H. Freeman, C.C Hull

GENERAL ANATOMY

SL.No.	TOPICS	HOURS
1	Introduction – Anatomy and it's sub-division, planes of the body, terms in relation of structures, Regional Anatomy, organ system	50
2	Tissues of the body (Histology of the body tissues) 2.1 Epithelium 2.2 Connective tissue 2.3 Bone and cartilage 2.4 Muscles – Skeletal, Plain, heart muscle 2.5 Blood vessels 2.6 Neuron, Neuroglia 2.7 Glands, exocrine and endocrine 2.8 Skin and appendages 2.9 Lymphoid Tissues	
3	Organ systems: (General plan) 3.1 Locomotor system : Bones, muscls, joints 3.2 Cardiovascular system: Heart, Regional blood vessels – arteries, veins 3.3Lymphatic system including immune system 3.4 Digestive System 3.5 Respiratory system 3.6 Reproductory system 3.7 Endocrine system 3.8 Central nervous system – spinal and brain stem, cerebellum, cerebrum	

OCULAR ANATOMY

1	Eye 1.1 Lids 1.2 Conjunctiva 1.3 Sclera 1.4 Cornea 1.5 Anterior chamber 1.6 Iris 1.7 Ciliary body 1.8 Choriod 1.9 Retina	30
2	Refractory media 1.1 Aqueous humor 1.2 Lens 1.3 Vitreous body	
3	Demonstration 3.1 Practical dissection of Bull's eye 3.2 Practical demonstration of orbital structures	

RECOMMENDED BOOKS

1. Human anatomy — B.D.Chourasia
2. Human anatomy — A.K.Dutta
3. Text book of Human anatomy — H Gray
4. Anatomy and Physiology of the eye — A.K. Khurana, Indu Khurana
5. Clinical anatomy of the eye — S.Snell, A Lemp

GENERAL PHYSIOLOGY

SL.NO	TOPICS	HOURS
1	1.1. Cell STRUCTURE AND ORGANISATION 1.2. Gene action 1.3. Tissue organization – Epithelium 1.4. Connective tissue – Collagen fibres-areolar fibers-cartilage – bone 1.5. Contractile tissue – striated – skeletal – cardiac – non striated – plain myoepithelial 1.6. General principles of cell physiology 1.7. Electrophysiology of cells 1.8. Physiology of skeletal muscles	55 hrs
2	Blood 2.1. Composition 2.2. Volume measurement and variations 2.3. Plasma proteins-classification and functions 2.4. RBC's development. Morphology and measurement-functions and dysfunctions 2.5. WBC's – development – classifications – morphology – functions and dysfunctions 2.6. Platelets – morphology-development, functions and dysfunctions 2.7. Clotting – factors-mechanism-anticoagulants-dysfunctions 2.8. Blood grouping-classifications-importance in transfusion, Rh factor & incompatibility 2.9. Suspension stability 2.10. Osmotic fragility 2.11. Reticulo endothelial system Spleen - lymphatic tissue Thymus - Bone marrow Immune system -cellular – humoral – autoimmune	
3	Digestion 3.1. General arrangement 3.2. Salivary digestion – functions and regulations 3.3. Gastric digestion- functions and regulations	

	3.4. Pancreatic digestion-functions and regulations 3.5. Intestinal digestion – functions and regulations 3.6. Liver and Bile 3.7. Absorption 3.8. Motility-deglutition-Gastric-Intestinal – Vomitting – Defecation 3.9. Functions of large intestine 3.10.Neurohumoral regulations of alimentary functions, summary	
4	Excretion 4.1. Body fluids- distribution, measurement and exchange 4.2. Kidney – structure of nephron – mechanism of urine formation-composition of urine and abnormal constituents-urinary bladder and micturition	
5	Endocrine system 5.1. Hormone mechanism-negative feedbacks-tropic action – Permissive action – cellular actions. 5.2. Hypothalamic regulation 5.3. Hormones, Actions & Regulations of ✓ Hypophysis ✓ Thyroid ✓ Adrenal Cortex & medulia ✓ Parathyroid ✓ Islets of pancreas ✓ Miscellaneous 5.4. Common clinical disorders	
6	Reproduction 6.1. Male reproductive system-control and regulation-semen analysis. 6.2. Female Reproductive system-Uterus-ovaries-menstrual cycle-Regulation – Pregnancy and delivery-breast – family planning	
7	Respiration 7.1. Mechanics of respiration 7.2. pulmonary function tests 7.3. Transport of respiratory gases 7.4. neural and chemical regulation of respiration 7.5. hypoxia cyanosis-dyspnoea-asphyxia	

8	Circulartion 8.1. Heart: myocardium-innervation-transmission of cardiac impulse-Events during cardiac cycle-cardiac output 8.2. Peripheral circulation: Peripheral resistance – Arterial blood pressure measurement factors regulation variation – capillary circulation0venous circulation 8.3. Special circulation: coronary – cerebral 8.4. Miscellaneous	
9	Nervous system 9.1. Neuron – conduction of impulse-synapse-receptor 9.2. Sensory organization pathways and perception Reflexes 9.3. Cerebral cortex – functions 9.4. Thalamus-basal ganglia-Cerebellum – Hypothalamus 9.5. Autonomic nervous system-motor control of movements, posture and equilibrium-conditioned reflex, Eye hand co-ordination Sleep, consciousness, behavior, memory	
10	Environmental Physiology 10.1. Body temperature regulation (including skin physiology) 10.2. Exposure to low and high atmospheric pressure	
11	Special senses (elementary) 11.1. Olfaction – Taste – Hearing – vision	
		55 Hrs

GENERAL PHYSIOLOGY – DEMONSTRATION

1	Microscope & Haemocytometer	
2	Blood 2.1. RBC count 2.2. Hb 2.3. WBC count 2.4. Differential count 2.5. Het Demonstration 2.6. ESR 2.7. Blood group and Rh type 2.8. Bleeding time and clotting time	
3.	Digestion – Test salivary digestion	
4.	Excretion 4.1. Examination of urine ✓ Specifie Gravity ✓ Albumin ✓ Sugar ✓ Microscopic examination for cells and cyst	
5.	Endocrinology & Reproduction 5.1. Dry experiments in the form of cases showing different endocrine Disorders	55
6.	Respiratory system 6.1. Clinical examination of respiratory system 6.2. Spirometry 6.3. Breath holding test 6.4. Endurance test	
7.	Cardiovascular system 7.1. Clinical examination of circulatory system ✓ Measurement of blood pressure and pulse rate ✓ Effect of exercise on blood pressure and pulse rate	
8.	Central Nervous System 8.1. Sensory system 8.2.Motor system 8.3. Cranial system 8.4. Superficial and deep reflexes 8.5. Test for hearing	
		55Hrs

2ND SEMESTER OF B. OPT

OCULAR PHYSIOLOGY

SL.NO.	TOPICS	HOURS
1	1. Protective mechanism in the eye. Eyelid and lacrimation, descriptive of the globe. 2. Extrinsic ocular muscles, thir action and control of their movements. 3. Coats of the eyeball 4. Cornea 5. Aqueous humour and vitreous 6. Intra ocular pressure 7. Iris and pupil 8. Crystalline lens and accommodation- Presbyopia 9. Retina structure & function 10. Vision – general aspects of sensation 11. Pigments of the eye and photo chemistry 12. The visual stimulus, refractive errors 13. Visual acuity 14. Visual perception-binocular vision, stereoscopic vision, optical illusion 15. Visual pathway, central & cerebral connections, lesions of pathways & effects 16. Colour vision and colour vision defects	35
		35 Hrs

RECOMMENDED BOOKS

1. Text book if medical physiology — Guyton
2. Human physiology — Choudhary
3. Human physiology — Chatterjee
4. Adler's physiology of the eye — Robert A.Moses, William M Hart. Jr

GENERAL BIOCHEMISTRY

SL.NO.	TOPICS	HOURS
1.	Buffers 1.1. Definition 1.2. Blood buffers 1.3. Mechanism of buffer action 1.4. H+ and PH measurement	40
2.	Biological macromolecules 2.1. Glycosaminoglycans 2.2. Collagens 2.3. Plasmaproteins 2.4. Muscle proteins 2.5. Nucleic acids	
3.	Enzymes 3.1. criteria for enzyme action 3.2. Clinically important enzymes	
4.	Fundamentals of biological oxidative reactions – ATP formation	
5.	Fundamentals of intermediary metabolism 5.1. EMP – HMP-TCA pathways 5.2. NADPH – Fats	
6.	Urea cycle 6.1. Important amino acids 6.2. common transamination reactions	
7.	Elements of protein synthesis	
8.	Lipid metabolism – B oxidation of fatty acids – synthesis-essential fatty acids – cholesterol – phospholipids – phosphor inositides- biological membranes-prostaglandins	
9.	Important Vitamins A,B,C, E and inositol	
10.	Regulatory mechanisms of ophthalmologically important vitamins	
11.	Minerals and trace metals-Copper, Iron, Calcium, Megnesium, Phosphorous, Sodium, Potassium, Zinc, Selinium	
12.	Free radicals-Biological reactions – oxidants-antioxidants-diseases – Therapeutic uses of antioxidants	

GENERAL BIOCHEMISTRY - DEMONSTRATION

1	1. Reaction of monosaccharides-disaccharides –qualitative 2. Estimation of Glucose 3. Estimation of proteins-ninhydrin reaction 4. Estimation of Vitamin C 5. Estimation of Vitamin A	
		40 Hrs

OCULAR BIOCHEMISTRY

SL.NO.	TOPICS	HOURS
1.	Importance of ocular biochemistry in clinical optometric practice	
2.	Tear film ✓ Composition –Lipid layer-Aqueous layer-Mucoid layer-Functions & dysfunction – Diagnostic tests – Tear substitutes – Recent development	
3.	Cornea ✓ Biochemical composition of epithelium-bowman's layer-stroma-Descemet's layer-endothelium-functions-corneal metabolism-nutrient uptake-energy transparency-barrier mechanism-pump action-irrigating solutions-aging and other anomalies-recent development	
4.	Lens ✓ Composition-metabolism-glucose utilization-sorbitol pathways-Glutathione and ascorbic acid transport-transparency-cataract formation-aging photo oxidation-sugar cataract-cataract and ascorbic acid-medical therapy-recent development	
5.	Aqueous humour ✓ Composition-function-Ciliary body-aqueous humour production-IOP-Glaucoma	
6.	Vitreous humour ✓ Structure-composition functions-viterous biochemical pathology-Intraocular gets-recent developments	

7.	Retina ✓ Pigment epithelium-structure-composition-photoreceptor cells-rhodopsin-lipids renewal-inner segment-Pigment epithelium-choroid – metabolism and function-phagocytosis – vitamin A-retinal function and metabolism. Retina neuropeptides. Biochemical correlates of retinal diseases	
		25 Hrs

RECOMMENDED BOOKS

1. Text book of biochemistry — Sitaram Acharya
2. Text book of biochemistry — A.C.Deb
3. Biochemistry — S.K.Dasgupta
4. Biochemistry of the eye — David R. whikehart

NUTRITION

SL.NO.	TOPICS	HOURS
1.	Introduction ✓ History of nutrition-Nutrition as science-Food groups – RDA – Balanced diet – diet planning – Assessment of nutritional status	10
2.	Energy ✓ Units of energy – Measurement and energy value of food – Energy expenditure- Total energy/Calorie – requirement for different age groups and diseases – Satiety value- energy imbalance – Obesity – starvation-Limitations of daily food guide	
3	Proteins ✓ Sources and functions – Essential and non essential aminoacids – Incomplete and complete proteins-Supplementary foods – PEM and the eye – Nitrogen balance- Changes in the protein requirement	
4.	Fats ✓ Functions and sources- Essential fatty acids – Excess and deficiency – Lipids and the eye- Hyperlipidemia – Heart diseases - Atherosclerosis	

5	Minerals ✓ General functions and sources – Macro and micro minerals associated with the eye –Deficiencies and excess – ophthalmic complications – Example: iron calcium, iodine etc	
6.	Vitamins ✓ General functions – Food sources – Vitamin deficiencies and associated eye disorders with particular emphasis on Vitamin A – Promoting sound habits in pregnancy, lactation and infancy – Nutrients with antioxidant Properties	
7.	Miscellaneous ✓ Measles and associated eye disorders, low birth weight.	
		10 Hrs

HOSPITAL PROCEDURE

SL.NO.	TOPICS	HOURS
	1. General idea about the role, importance and procedures of the following within the hospital set up 2. Medical records 3. Medical photography 4. Computer networking system 5. Laboratory technology	10
		10 Hrs

SECOND YEAR B. OPT. SYLLABUS

(3rd Semester of B. OPT.)

- Optometric and Dispensing Optics
- Visual Optics
- Optometric Instruments & Clinical Examination of Visual System

(4th Semester of B. OPT.)

- Pharmacology
- Pathology & Microbiology
- Research methodology & Statistics

(3rd Semester of B. OPT.)

OPTOMETRIC OPTICS (THEORY)

Sl. No	TOPICS	HOURS
1	Spectacle Lenses - I 1.1 Introduction to spectacle lenses 1.2 Forms of lenses, spectacle tools 1.3 Spherical, Cylindrical and sphero cylindrical lenses 1.4 Properties of crossed cylinders 1.5 Transposition of Spherocylindrical lenses 1.6 Toric lenses, Toric transposition 1.7 Astigmatic lenses, Methods of writing prescriptions 1.8 Axis Direction of astigmatic lenses 1.9 Obliquely crossed cylinders 1.10 Sag Formulae, Lens measure 1.11 Vertex distance and vertex power 1.12 Tilt induced power 1.13 Aberrations in ophthalmic lenses	35
2	Spectacle Lenses - II 1.1 Manufacture of glass 1.2 Lens surfacing 1.3 Principle of surface generation and glass cements 1.4 Lens quality 1.5 Faults in lens material 1.6 Faults on lens surface 1.7 Inspecting the quality of lenses	08
3	OPTHALMIC PRISMS 1.1 Definition of prisms, Units of prism power 1.2 Thickness difference and Base apex notations 1.3 Dividing, Compounding and Resolving prisms 1.4 Rotary prisms and effective prism power in near vision 1.5 Prismatic effect, decentration, Prentice Rule 1.6 Prismatic effect of spherical lenses, spherocylinders and plano cylinders 1.7 Differential prismatic effects	15
4	SPECTACLE FRAMES 4.1 Types and parts 4.2 classification of spectacle frames-material, weight, temple position, Coloration 4.3 Frame construction, frame measurements and markings 4.4 Frame selection, ordering, verification and dispensing	10

	4.5 Size, shape, mounting and field of view of ophthalmic lenses	
5	TINTED & PROTECTIVE LENSES 5.1 Characteristics of tinted lenses 5.2 Absorptive Glasses 5.3 Polarizing Filters 5.4 Photochromic Filters 5.5 Reflecting filters 5.6 Safety lenses – Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses	08
6	MULTIFICAL LENSES – Introduction, history and development, types, identification and dispensing. 6.1 Bifocal lenses 6.2 Trifocal lenses 6.3 Progressive addition lenses	15
7	Lenticular lenses and aspherical lenses	
8	MISCELLANEOUS SPECTACLE LENSES 8.1 Iseikonic Lenses, Spectacle Magnifiers 8.2 Recumbent prisms 8.3 Fresnel prism and lenses	02
9	REFLECTION FROM SPECTACLE LENSE SURGACES & LENS COATINGS 9.1 Reflection from spectacle lenses – ghost images – Reflections in bifocals at the dividing line 9.2 Antireflection coating Mirror coating, Hard Coating [HMC], Hydrophobic coating	05
		100 Hrs

DISPENSING OPTICS (PRACTICAL)

Sl. No	TOPICS	HOURS
1	DISPENSING OPTICS 1. Surfacing and polishing glass lenses 2. Glazing 3. Frame manipulation and repair 4. Facial measurement and frame choice 5. Power and dimension measurements of complete pair of spectacles 6. Lens faults inspections 7. Measrements of assorted faces for spectacle 8. Making and edging of bifocal lenses 9. Edging of lenses for plastic, metal and rimless frames 10. Complete dispensing for subjects-single vision, bifocals and progressive Addition lenses 11. Special lenses – examination of specimens	40
		40 Hrs

RECOMMENDED BOOKS

1. Principles of Ophthalmic lenses — M.O. Jalie – 2nd edition
2. System for ophthalmic dispensing — Clifford.W. Brooks, Irwin M. Borish
3. Clinical Optics — Troy Fannin, Theodore Grosvenor 2nd edition
4. Ophthalmic lenses & dispensing — M.O. Jalie – 2nd edition
5. Practical aspects of ophthalmic optics — Margeret dowaliby – 4th edition

VISUAL OPTICS (THEORY)

Sl. No	TOPICS	HOURS
1	1. REVIEW OF GEOMETRICS OPTICS 1.1 Vergence ad powder 1.2 Conjugacy, Objective space and image space 1.3 Sign convention 1.4 Spherical refracting surface 1.5 Spherical Mirror, catoptric power 1.6 Cardinal points 1.7 Magnification	02
2	OPTICS OF OCULAR STRUCTURES 2.1 Cornea and aqueous 2.2 Crystalline lens 2.3 Vitreous 2.4 Schematic and reduced eye	02
3	MEASUREMENTS OF OPTICAL CONSTANTS OF EYE 3.1 Corneal curvature and thickness 3.2 Keratometry 3.3 Curvature & thickness of the lens	02
4	REFRACTIVE ANOMALIES AND THEIR CAUSES 4.1 Etiology of refractive anomalies 4.2 contributing variabilities and their ranges 4.3 Populating distributions of anomalies 4.4 Optical component measurement 4.5 Growth of eye in relation to refractive errors	02
5	VISUAL ACUITY 5.1 Definition, specification, Conversion, measurement & Recording (Distance & Near) 5.2 Test types (Distance & Near) 5.3 Contrast sensitivity 5.4 Trial set & Trial frame	05
6	REFRACTIVE CONDITIONS Aetiology, optical condition types, clinical features and management 1.1 Emmetropai / Ametropia 1.2 Myopia 1.3 Hyperopia 1.4 Astigmatism 1.5 Anisometropia and Aniseikonia 1.6 Presbyopia 1.7 Aphakia and pseudophakia, Biometry 1.8 Axial Vs Refractive Ametropia	25

7	ACCOMMODATION 7.1 Mechanism 7.2 Range & Amplitudes of accommodation 7.3 Anomalies of accommodation	06
8	CONVERGENCE 8.1 Types, measurement & Anomalies 8.2 Relation between accommodation & convergence	03
9	Retinoscopy (Static & Dynamic) 9.1Principle, instrumentation & types 9.2 Procedure & interpretation of findings – Transposition & Spherical equivalent 9.3 Dynamic retinoscopy – various methods 9.4 Radical retinoscopy & Mohindra's near retinoscopy 9.5 Subjective refraction – Principle, astigmatic chart, binocular balancing & binocular refraction 9.6 Cycloplegic refraction	18
10	EFFECTIVE POWER & MAGNIFICATION 10.1 Ocular refraction Vs Spectacle refraction 10.2 Ocular accommodation Vs Spectacle accommodation 10.3 Spectacle magnification & Relative spectacle magnification 10.4 Retinal image blur – Depth of focus & Depth of field	03
		70 Hrs

VISUAL OPTICS (PRACTICAL)

Sl. No	TOPICS	HOURS
Part I	2. Study of purkinje images I & II, III & IV 3. Mathematical model of the eye – Emmetropia, Hyperopia & Myopia 4. Effect of trial lenses & accessories in front of the eye	60
Part II	1. Visual acuity ✓ Measurement & recording (Distance & Near) 2. Retinoscopy – Practice of retinoscopy (Dry & Wet) in ✓ Emmetropia, Myopia, Hypermetropia, Astigmatism, Anisometropia, Presbyopia, Aphakia, Pseudophakia, media opacities, strabismus & eccentric fixation ✓ Interpretation of retinoscopic findings ✓ Subjective verification ✓ Prescription writing ✓ Methods of differentiating axial Vs Refractive ametropia ✓ Dynamic retinoscopy – Methods 3. Accommodation & Convergence ✓ Measurement of range & Amplitude of accommodation ✓ Measurement of Near point of Convergence	
		60 Hrs

RECOMMENDED BOOKS

1. Duke Elder's practice of refraction — David Abrams – 10th edition
2. Clinical refraction — Irwin. M. boorish
3. Primary care optometry — Theodore Grosvenor – 4th edition
4. Clinical pearls in refractive care — D. Leonard Werner, Leonard. J. Press

OPTOMETRIC INSTRUMENTS

SL. NO	TOPICS	HOURS
1	Pre examination history	02
2	1.1. Visual acuity charts – Construction & Standards 1.2. Illumination of the consultation room 1.3. Trial case lenses – best from lenses 1.4. Trial frame design – Phoropter – Advantages & Difficulties 1.5. Retinoscope – Optics, types & adjustments 1.6. Projection Charts	15
3	Keratometer 2.1. Keratometric principle 2.2. Types – Baush & Lomb, Javal-Schiotz models 2.3. Measurement, Documentation & Interpretation of data	04
4	Lens checking instruments 3.1. Optometer principle 3.2. Badal & non badal principle – Advantage & disadvantages 3.3. Lens gauger or clock 3.4. Hand neutralization	06
5	Slit Lamp 1.1. Slit-lamp systems 1.2. Mechanical design 1.3. Illmination techniques 1.4. Accessories 1.5. Scanning laser devices	09
6	Autorefractometer 1.1. Scheiner's principle 1.2. Advantages & disadvantages 1.3. Newer developments	03
7	Corneal topography 6.1. Placido's disc 6.2. Photokeratoscope 6.3. Topography Modelling System	05
8	Tonometer 7.1. Tupes, principle & standardization (Schiotz, Applanation & NCT) 7.2. Measurement, documentation & interpretation of results	07
9	Color vision testing devices 8.1. Color vision theories 8.2. Common color vision defects 8.3. Pseudoisochromatic test plates 8.4. Color arrangements tests 8.5. Interpretation & clinical significans of findings	09
10	Fields of vision & Screening devices 9.1. Introduction – Visual fields & boundaries of visual fields 9.2. Visual field screening devices – Central & Peripheral 9.3. Quantitative perimetry – Manual & Automated 9.4. Results & Analysis of visual field examination	18
11	Ophthalmoscopes 10.1. Optical principle & Types 10.2. Direct ophthalmoscope – Instrumentation, Characteristics & Uses 10.3. Indirect ophthalmoscope- Instrumentation, Characteristics & Uses 10.4. Direct ophthalmoscope Vs Indirect ophthalmoscope	08

12	Fundus biomicroscope 11.1. Direct fundus biomicroscopy – Principle & Instrumentation (with examples) 11.2. Indirect fundus biomicroscopy – Principle & Instrumentation (with examples)	03
13	Gonioscope 12.1. Principle & Instrumentation 12.2. Direct Gonioscope 12.3. Indirect Gonioscope	05
14	Ophthalmic Ultrasonagraphy 14.1. Physics of Ultrasonography 14.2. A-scan – Procedure & clinical uses 14.3. B-Scan – Procedure & Clinical uses	07
15	Electrophysiology – ERG, VEP & EOG	06
16	Fundus camera & Flourescine angiography	03
		110 Hrs

CLINICAL EXAMINATION OF VISUAL SYSTEM

SL.NO	TOPICS	HOURS
1	History of the ophthalmic subject 1.1. Ocular history 1.2. Medical history 1.3. Family history 1.4. Systemic history	**40**
2	Assessment of visual acuity 2.1. Distance & Near visual acuity 2.2. Clolr vision & Contrast sensitivity	
3	Examination of Extra Ocular Muscle balance	
4	Assessment of accommodation & Convergence	
5	Pupil evaluation & Measurement of Intra pupillary distance (IPD)	
6	Slit Lamp examination 6.1. Examination of eye lids, conjunctiva & sclera 6.2. Examination of cornea & lens 6.3. Examination of iris, Ciliary body & pupil	
7	Examination of Intra ocular pressure – Schiotz & Applanation	
8	Assessment of angle of anterior chamber	
9	Ophthalmoscopy – Direct & Indirect	
10	Optic disc evaluation	
11	Examination of Lacrimal system	
12	Examination of orbit	
13	Macular function tests	
14	Visual field charting – Central & Peripheral	
		40 Hrs

RECOMMENDATION BOOKS

1. Optometric instrumentation — David B. Henson
2. Clinical ophthalmology (VOL –I) — Thomas D. Duane
3. Primary care Optometry — Theodors Grosvenor – 4th edition
4. Clinical Procedure in Optometry — J.Boyd Eskside, john. F. Amos, Jimmy. D. Bartlet 1st edition
5. Automated state perimetry — Anderson & Patella – 2ns edition
6. Investigation techniques & Ocular examination — Sandip Doshi, William Harvey
7. Diagnosis of defective color vision — Jennifer birch – 2nd edition

(4th Semester of B. OPT.)

PHARMACOLOGY

SL NO	TOPICS	HOURS
1	GENERAL PHARMACOLOGY Introduction and sources of drugs Routes of drug administration Pharmacokinetics- special emphasis on ocular pharmacokinetics Pharmacodynamics Adverse drug reactions-Special emphasis on ocular toxicity of drugs Factors modifying drug action	
2	SYSTEMIC PHARMACOLOGY 2.1. Autonomic nervous system ✓ Introduction. Neurotransmitters, their mechanism of action. ✓ Drugs affecting- - Pupillary size and light reflex - Intraocular tension - Accommodation ✓ Skeletal muscle relaxants 2.2. Cardiovascular system ✓ Antihypertensives and drugs useful in angina 2.3. Diuretics ✓ IN ocular disorders 2.4. Central nervous system ✓ Alcohol, sedative hypnotics, general & local anesthetics, opioids & non-opioids 2.5. Chemotherapy ✓ Introduction, general chemotherapy ✓ Specific chemotherapy - antifungal, Antiviral, Antitubercular, Antileprotic 2. 6. Hormones ✓ Corticosteroids ✓ Anitidiabetics 2.7.Blood ✓ Coagulants	45
3	OCULAR PHARMACIOLOGY 3.1 Ocular preparations, formulations and requirements of an ideal agents 3.2 Ocular pharmacokinetics-Methods of drug administration -Special drug delivery systems 3.3 Ocular toxicology	

4	DIAGNOSTIC AND THERAPUTIC APPLICATIONS OF DRUGS IN OPHTHALMOLOGY 4.1. Agents used to aid diagnosis 4.2. Drugs and biological agents used in ocular surgery 4.3. Anesthetics used in ophthalmic procedures 4.4. Drug treatment of glaucoma, accommodative esotropia and ocular myasthenia 4.5. Pharmacotherapy of ocular infections-Bacterial, Viral, Fungal, Chlamydial 4.6. Drugs used in allergic conditions of the eye 4.7. Drugs used in inflammatory disorders of the eye 4.8. Drug treatment of degenerative disorders of the eye 4.9. Immunomodulators in ophthalmic practice 4.10. Use of other agents in ophthalmic practice Enzymes, Vitamins, Trace elements, Antioxidants, Wetting agents, Tear substitutes	
		45 Hrs

RECOMMENDED BOOKS

1. Essentials of medical pharmacology	Tripati
2. Optometric Pharmacology	Julie Griebrok Jose, Kenneth.A.Poise, Emily Holden
3. Ocular drug consult	Milton.M.Hom
4. Anterior eye diseases & Therapeutics	A. S. Bruce, M. S. Loughnan
5. Clinical Ocular Pharmacology	Jimmy. D. Bartlett, Siret. D. Jaanus - 4^{ft} edition

MICROBIOLOGY

SL NO	TOPICS	HOURS
1	1. Sterilization and Disinfection generally used in laboratory and hospital practice 2. Details of common bacteria, viruses and other organisms 3. Morphology and principles of cultivation of bacteria 4. Common bacterial infections of the eye 5. Common fungal infections of the eye 6. Common viral infections of the eye 7. Common parasitic infections of the eye	30
		30Hrs

RECOMMENDED BOOKS

1. Text book of microbiology	Ananth Narayan

PATHOLOGY

SL NO.	TOPICS	HOURS
	1. General introduction 2. Inflammation and repair 3. Infections [Tuberculosis, Leprosy, Syphilis, Fungus, Virus, Chlamydiae] 4. Genetic abnormality 5. Hematology [Anemia, Leukemia, Bleeding disorders] 6. Circulatory disturbances [Shock, edema, Thrombosis, Infarction, Embolism] 7. Clinical pathology [Examination of urine and blood smears] 8. Ophthalmic wound healing 9. Eyelid [normal and pathology including inflammations and tumours] 10. Cornea [Normal and pathology in degeneration and dystrophies] 11. Lens [normal and pathology of cataract] 12. Retina [normal and pathology hi inflammatory diseases, infections] 13. Intraocular tumours [Retinoblastoma and chorMdal melanoma] 14. Orbit [inflammation and neoplasia] 15. Optic nerve [normal and tumours]	25
		25Hrs

RECOMMENDED BOOKS

1. General pathology — Harsh Mohan
2. Text book of Pathology — N. C. Dey
3. Basic Pathology — Robbins

RESEARCH METHODOLOGY & STATISTICS

L	TOPICS	HOURS
1	**Introduction I: Biostatistics** ✓ Definition ✓ role of statistics in health science and health care delivery system	**60**
2	**Introduction II: Research Methodology** ✓ Research process ✓ Steps involved in research process ✓ Research methods and methodology	
3	**Variables and scales of measurements** ✓ Definitions and examples of qualitative, quantitative, continuous discrete, dependent and independent variables. ✓ Definitions, properties and examples of nominal, ordinal, interval and ratio scales of measurements.	
4	**Sampling** ✓ Population, sample, sampling, reasons for sampling, probability and non-probability sampling. ✓ Methods of probability sampling - simple random, stratified, systematic-procedure. ✓ Merits and demerits. ✓ Use of random number table.	
5	**Organization of data** ✓ Frequency table, histogram, frequency polygon, frequency curve, bar diagram, pie chart	
6	**Measures of location** ✓ Arithmetic mean, median, mode, quartiles and percentiles-definition. ✓ Computation (for raw data), merits, demerits and applications	
7	**Measures of variation** ✓ Range, inter-quartile range, variance, standard deviation, coefficient of variation- definition. ✓ Computation (for raw data), merits, demerits and applications	
8	Normal distribution ✓ Concept, graphical form, properties, examples. ✓ Concept of Skewnes and Kurtosis	
9	**Correlation** ✓ Scatter diagram. ✓ concept and properties of correlation coefficient, examples [No computation]	
10	**Health Information System** ✓ Definition, requirement, component and uses of health information system. ✓ Sources of health information system- Census, Registration of vital events, Sample registration system (SRS), Notification of diseases, Hospital records, Disease registries, Record linkage, Epidemiological surveillance. Population survey	

11	**Vital statistics and hospital statistics** ✓ Rate, ratio, proportion, Incidence, Prevalence. Common morbidity, mortality and Fertility statistics - Definition and computation. ✓	
12	**Hypothesis** ✓ What is hypothesis. ✓ Formulation of hypothesis. ✓ Characteristics of good hypothesis.	
13	Epidemiology ✓ Concept of health and disease ✓ Definition and aims of Epidemiology, ✓ Descriptive Epidemiology – methods and uses.	
14	Concept of reliability & validity	
		60 Hrs

RECOMMENDED BOOKS

1. Methods in Biostatistics for medical students & Research workers — Mahajan B.K.-6th edition
2. Research methodology – Methods & techniques — Kothari C.R
3. Introduction to Biostatistics: A manual for students in health sciences — Sundar Rao PSS, Richard J.
4. Text book of Preventive and social medicine — Park. E..Park

CLINICAL PSYCHOLOGY

SL.NO.	TOPICS	HOURS
1	1. Introduction to psychology 2. Intelligence, Learning, Memory, Personality, Motivation 3. Body integrity-one's body image 4. Patient in his Milan 5. Self concept of the therapist, Therapist patient relationship-some guidelines 6. Illness and it's impact on the patients 7. Maladies of the age and their impact on the patient's own and others concept of his body image 8. Adapting changes in vision 9. Why Medical Psychology needs/demands commitment?	**20**
		20 Hrs

THIRD YEAR B. OPT. SYLLABUS

(5th Semester of B. OPT.)

- Contact Lens
- Squint and Binocular Vision
- Ocular Diseases + Eye and Systemic Diseases

(6th Semester of B. OPT.)

- Low vision aids
- Geriatric Optometry & Pediatric Optometry
- Community & Occupational Optometry

(5th Semester of B. OPT.)

CONTACT LENS (THEORY)

Sl. No	TOPICS	HOURS
1	11.History of Contact Lens 1.2.Lacrimal apparatus - Anatomy & Physiology 1.3.Cornea - Anatomy & Physiology 1.4.Corneal physiology & Contact Lens 1.5.Slit-lamp biomicroscopy 1.6.Keratometry 1.7.Placido's disc 1.8.Topography 1.9.Preliminary measurements & Investigations	20
2	2.1.Contact Lens materials 2.2.Glossary of terms- Contact lenses 2.3.Optics of Contact lenses 2.4.Indications & Contraindications	11
3	33.1.RGP contact lens design 3.2.Soft Contact lens design 3.3.Fitting philosophies 3.4.Handling of contact lens	07
4	4.1.Fitting of spherical soft CL & Effect of parameter changes 4.2.Fittign of spherical RGP contact lenses - Low Dk & High Dk 4.3.Effect of RGP CL parameter changes on lens fitting 4.4.Fitting in astigmatism - Toric CL	13
5	5.1.Follow-up post fitting examination 5.2.Follow-up slit-lamp examination 5.3.Lens care and hygiene, instructions, compliance 5.4.Contact Lens solutions 5.5.Care of contact lenses	08
6	6.1.Fitting in Aphakia, Pseudophakia 6.2.Fitting in irregular astigmatism - Keratoconus/PMD etc 6.3.Bifocal contact lenses 6.4.Fitting contact lenses in children 6.5.CL fitting following ocular surgeries 6.6.Therapeutic contact lens - Bandage CL 6.7.Cosmetic contact lenses 6.8. Contact lenses for special purposes- Swimming, sports, occupational etc	22
7	7.1.Continuous wear & extended wear contact lenses 7.2.Disposable contact lenses 7.3. Frequent replacement contact lenses	03

8	8.1.Modifications of finished CL 8.2.Inspection & Verification of finished contact lenses 8.3.Use of Specular microscopy & Pachymetry in CL practice	06
9	9.1.Contact lens deposits 9.2.Complications of contact lens wear	06
10	10.1.Recent developments in contact lenses 10.2.Review of Contact lenses & Solutions available in India 10.3. Current contact lens research.	04
		100 Hrs

CONTACT LENS PRACTICAL

Sl. No	TOPICS	HOURS
1	1.1.Fitting & Dispensing of contact lenses in Myopia, Hyperopia, Astigmatism, Presbyopia, Anisometropia, Aphakia, Pseudophakia, Keratoconus, PMD etc 1.2.Paediatric contact lens fitting 1.3.CL fitting following ocular surgeries 1.4.Visit to factories manufacturing contact lenses	70
		70 Hrs

RECOMMENDED BOOKS

1. Contact Lenses — Antony.J.Philips, Janet Stone
2. Textbook of Contact Lenses — V.K.Dada 4th Edition
3. Contact Lens Practice — Ruben & Guillon
4. Color Atlas of Contact Lens — Montague Rubem
5. Contact Lens The CLAO guide — Peter.R.Castle
6. IACLE Contact Lens modules — International Association of Contact Lens Educators, Sydney, Australi
7. Manual of Contact Lens prescribing & Fitting — Milton.M.Hom-3rd edition
8. Manual of Gas Permeable contact Lens — Edward.S.Bennet, Milton.M.Hom-2nd edition
9. Clinical manual of specialized CL prescribing — Terry.R.Scheid
10. Clinical Contact Lens Practice — Edward.s.Bennet, Barry.A.weissman
11. Cosmetic Contact Lens & Artificial eyes — Devendra Kumar & Gopal Krishnan
12. Common Contact Lens Complications — lyndon. W.Jones, Deborah.A.Jones
13. Anterior segment Complication of CL wear — Joel Silbert-2nd edition

SQUINT AND BINOCULAR VISION (THEORY)

Sl. No	TOPICS	HOURS
1	1.1.Anatomy & Physiology of extra ocular muscles 1.2.Spatial sense 1.3.Binocualr vision ✓ Definition ✓ Mechanism ✓ Developmen ✓ Grades & Test of BSV ✓ Binocular fusion, suppression, rivalry, Summation ✓ Visual direction & Corresponding points ✓ Visual distance & Monocular clues ✓ Pannum's space ✓ Longitudinal Horopter ✓ Neural aspects of binocular vision	18
2	2.1 Visually guided behavior & Aniseikonia 2.2.ARC ✓ Mechanism ✓ Common tests 2.3.Stereopsis ✓ Definition & Tests 2.4.Synaptophore	07
3	3.1.Amblyopia ✓ Definition & Classification ✓ Clinical characteristics ✓ Diagnosis & Management 3.2.Eccentric Fixation 3.3.Pseudostrabismus	05
4	4.1.Qualitative & quantitative diagnosis of strabismus 4.2.Etiology, Classification, Clinical characteristics, Tests & Treatment of ✓ Esodeviations ✓ Exodeviations ✓ A-V phenomenon ✓ Cyclovertical squints ✓ Special forms of strabismus	20
5	Paralytic squint 5.1.Paralysis of individual extra ocular muscles 5.2.Clinical characteristics, diagnostic tests & management	06

6	Nystagmus ✓ Types, Etiology, Clinical characteristics & Treatment	02
7	Management of strabismus ✓ Non-surgical ✓ Surgical	02
		60 Hrs

SQUINT & BINOCUALR VISION PRACTICALS

Sl. No	TOPICS	HOURS
1	Strabismus assessment ✓ Cover test, Krimsky, Synaptophore, Sterioacuity test, Diplopia charting Examination procedures of different types of strabismus and its non-surgical management	40
		40 Hrs

RECOMMENDED BOOKS

1. Binocular vision & Ocular motility — Von Noorden-6th edition
2. Clinical management of binocular vision — M.Scheimann, Bruce Wick 2nd edition
3. Binocular anomalies — John.R.Griffin, J.David Grisham -4th edition
4. Practical binocular vision assessment — Frank Eperjesi, Michelle.M.Rundstorm
5. Binocular vision & Orthoptics — Bruce Evans, Sandip Doshi

OCULAR DISEASES

Sl. No	TOPICS	HOURS
1	**EYELIDS** 1..Eye lid anatomy 12 .Congenital and developmental anomalies of eyelids 1.3.Blepharospasm 1.4 .Ectropion and Entropion 1.5 .Trichiasis and symblepharon 1.6 Eyelid inflammations 1.7. Eyelid tumours 1.8 .Ptosis 1 1.9 . Eyelid retractions 1.10.Eyelid trauma	

2	**LACRIMAL SYSTEM** 2.1.Lacrimal anatomy 2.1 Lacrimal pump 2.2 Methods of Lacrimal evaluation 2.3 . Congenital and developmental anomalies of Lacrimal system 2.4. Lacrimal obstructions 2.5 Lacrimal sac tumours 2.6 Lacrimal trauma	
3	**SCLERA AND EPISCLERA** 3.1.Ectasia and staphyloma 3.2.Scleritis and episcleritis	
4	**ORBIT** 4.1.Orbital anatomy 4.2.Incidence of orbital abnormalities 4.3.Methods of orbital examinations 4.4.Congenital and developmental anomalies of orbit 4.5.0rbital tumours 4.6.Orbital inflammations 4.7 Sinus disorders affecting the orbit 4.8.Orbital trauma	
5	CONJUNCTIVA & CORNEA 5.1.Inflammation 5.2.Therapeutic principles, specific inflammatory diseases 5.3.Tumours ✓ Tumours of epithelial origin ✓ Glandular and adenexal tumours ✓ Tumours of neuroectodermal origin ✓ Vascular tumours ✓ Xanthomatous lesions ✓ Inflammatory lesions ✓ Metastatic tumours 5.4. Degenerations & dystrophies ✓ Definitions ✓ Degenerations & dystrophies 5.5. Miscellaneous conditions ✓ Keratoconjunctivitis Sicca ✓ Tear function tests ✓ Steven Johnson Syndrome ✓ Ocular Rosacea ✓ Atopic eye disorders ✓ Benign Mucosal Pemphigoid- ocular pemphigoid ✓ Vitamin A deficiency ✓ Metabolic diseases associated with corneal changes	
6	LENS 6.1.Anatomy and pathophysiology ✓ Normal anatomy and aging process ✓ Developmental defects ✓ Acquired lenticular defects 6.2.Management of lenticular defects	

7	IRIS, CILIARY BODY & PUPIL 7.1 Congenital anomalies 7.2 Primary and secondary diseases of iris and ciliary body 7.3 Tumours 7.4 Anomalies of pupillary reactions	
8	CHOROID 8.1 Congenital anomalies of choroid 8.2 Diseases of choroid 8.3 Tumours	
9	VITREOUS 9.1 Developmental abnormalities 9.2 Hereditary hyaloidoretinopathies 9.3 Juvenile retinoschisis 9.4 Asteroid hyalosis 9.5 Cholesterolosis 9.6 Vitreous haemorrhage 9,7 Blunt trauma and the vitreous 9.8 Inflammation and vitreous 9.9 Parasitic infestations 9.10.Pigment granules in vitreous 9.11.Vitreous complications in cataract surgery	
10	RETINA 10.1.Retinal vascular diseases 10.2.Diseases of choroidal vasculature, Bruch's membrane and retinal pigment epithelium 10.3.Retinal tumours ✓ Retinoblastoma ✓ Retinal and optic nerve head astrocytomas ✓ Lymphoid tumours 10.4.Retinal vascular disorders 10.5. Retinal inflammations 10.6. Metabolic diseases affecting the retina 10.7. Electromagnetic radiation effects on the retina 10.8. Hereditary macular disorders [Including albinism 10.9.Peripheral retinal Degenerationns 10.10.Retinal holes and detachments 10.11.Intraocular foreign bodies 10.12.Photocoagulation 10.13.Miscellaneous disorders	
11	NEURO OPHTHALMOLOGY 11.1.Neuroopathalmic examination ✓ History	

	✓ Visual function testing ✓ Technique of pupillary examination ✓ Ocular motility ✓ Checklist for testing 11.2. Visual sensory system ✓ The retina ✓ The optic disc ✓ The optic nerve ✓ Optic chiasma ✓ Optic tracts ✓ Lateral geniculate body ✓ Optic radiations ✓ Visual cortex ✓ Visual field ✓ Blood supply of anterior and posterior visual systems ✓ Disorders of visual integration 11.3.Ocular motor system 11.4.The facial nerve 11.5.Pain and sensation from the eye 11.6.Autonomic nervous system 11.7.Selected systemic disorders with neuro ophthalmologic signs	
12	GLAUCOMA 12.1.An overview of glaucoma 12.2.Aqueous humour dynamics- Gonioscopy 12.3.Intraocular pressure and Tonometry 12.4.Evaluation of optic nerve head 12.5. Visual fields 12.6.Glaucoma screening 12.7.Classification of glaucoma 12.8.Primary open angle glaucoma 12.9.Primary angle closure glaucoma 12.10.Primary congenital glaucoma 12.11.Secondary glaucoma 12.12.Principles of medical therapy 12.13.Other modalities of glaucoma treatment	
13	BLINDNESS 13.1.Definitions 3.2.Causes 13.3.Social implications 13.4.Rationale in therapy	

EYE AND SYSTEMIC DISEASES

Sl. No	TOPICS	HOURS
1	ARTERIAL HYPERTENSION 1.1.Pathophysiology, classification, clinical examination, Diagnosis 1.2.Complications, management 1.3.Hypertension and the eye	30
2	DIABETES MELLITUS 2.1.Pathology, classifications, clinical features 2.2.Diagnosis, complications, management 2.3. Diabetes mellitus and the eye	
3	ACQUIRED HEART DISEASES- EMBOLISM 3.1.Rheumatic fever- Pathophysiology, classifications, diagnosis complications and management 3.2.embolism 3.3.Subacute bacterial endocarditis	
4	CANCER-INTRODUCTION 4.1.Definition, nomenclature, characteristics of benign and malignant 4.2.Grading of staging of cancer, diagnosis, principles of treatment 4.3.Neoplasia and the eye	
5	CONNECTIVE TISSUE DISEASES 5.1.Anatomy and pathophysiology: arthritis 5.2.Eye and connective tissue diseases	
6	THYROID DISEASE 6.1.Anatomy and physiology of thyroid gland 6.2.Classification of thyroid disease 6.3.Diagnosis, complications, clinical features, management 6.4.Thyroid disease and the eye	
7	TUBERCULOSIS 7.1.Etiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complication, treatment 7.2.Tuberculosis and the eye	
8	HELMINTHIASIS 8.1.Classification of helminthic diseases, - schistosomiasis, 8.2.principles of diagnosis and management 8.3.Helminthic disease and the eye[Taenia., echinococcus, larva migrans	
9	COMMON TROPICAL MEDICAL AILMENTS 9.1.Introduction to tropical diseases: malaria 9.2.Tropical diseases and the eye- leprosy, toxoplasmosis, syphilis,	

	Trachoma	
10	MALNUTRITION 10.1.Etiology & nutritional disorders of the eye	
11	INTRODUCTION TO IMMUNOLOGY 11.1.ntroduction & components of immune system 112.Principles of immunity in health 11.3.Immunology in disease 11.4.Immunology and the eye	
12	GENETICS 12.1.Introduction to genetics 12.2.Organisation of the cell 12.3.Chromosome structure and cell division 12.4.Gene structure and basic principles of genetics 12.5.Genetic disorders and their diagnosis 12.6.Genes and the eye 12.7.Genetic counseling and genetic engineering	
		120 Hrs

RECOMMENDED BOOKS

1. Clinical Ophthalmology — Jack J.Kanski-4th edition
2. Textbook of Ophthalmology — A.K.Khurana
3. Parson's diseases of the eye — Revised by Ramanjith Sihota & Radhika Tandon
4. Glaucoma Handbook — Anthony.B.Litwak

(6th Semester of B. OPT.)

LOW VISION AIDS (THEORY)

Sl. No	TOPICS	HOURS
1	Introduction 1.. Definition & Classification 1.2. Causes of Low Vision 1.3. Optometrist's role in Low Vision management	04
2	Examination of a Patient with Low vision 2.1.Case history 2.2.Visual acuity ✓ Distant vision- Charts, measurement & Documentation ✓ Near vision Charts, measurement & Documentation ✓ Refraction -Significance & Technique ✓ Diagnostic procedures in low vision examination	05
3	Optics & Characteristics of Low vision aids 3.1. Magnification 3.2. Galilean telescope Vs Keplarian Telescopes 3.3.Spectacle magnifiers 3.4.Hand Magnifiers 3.5.Stand Magnifiers 3.6.CCTV 3.7.Bioptic telescopes 3.8.Accessory low vision aids	12
4	Selection of Low vision aids for distance, intermediate & Near	02
5	Guidelines & training to use various aids	02
6	Choices of tests &Aids in various pathological conditions 6.1.Conditions causes overall blurring of the visual field 6.2.Condions causes central field defects 6.3.Conditions causes peripheral fieid defects	08
7	Light, glare & Contrast in Low vision care & Rehabilitation	01
8	Children with low vision	03
9	Genetics	01
10	Rehabilitation of visually handicapped	02
		40 Hrs

LOW VISION AIDS PRACTICAL		
1	Demonstration followed by evaluation of a low vision patient by students • Low vision case history • Visual acuity measurement & Documentation • Refraction • Needed diagnostic tests for each pathological condition • Selection, trial & dispensing of visual aids • Rehabilitation methods	
		30 Hrs

RECOMMENDED BOOKS

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

GERIATRIC OPTOMETRY

Sl. No	TOPICS	HOURS
1	1.1.Introduction 1.2.structural & physiological changes in the eye associated with ageing ✓ Structural changes to lid & adnexa ✓ Physiological changes to cornea, lens & Uvea ✓ Degenerative & Physiological changes in vitreous, choroid & retina	04
2	2.1.Optical& refractive changes ✓ Refractive changes in cornea, lens & vitreous ✓ Refractive changes due to diabetes ✓ Refractive changes due to uveitis	03
3	Ocular diseases ✓ Cataract ✓ Glaucom ✓ Macular disorders	04

	✓ Vascular disorders	
4	Optical correction of refractive conditions	05
5	Dispensing in geriatric age groups ✓ Spectacle ✓ Contact lenses	05
		20 Hrs

RECOMMENDED BOOKS

1 vision of the ageing patient Hirsch Wick
2. Vision & Aeing- General & Clinical perspective Alfred Rosenboom, Meredith. W.Morgan

PEDIATRIC OPTOMETRY

Sl. No	TOPICS	HOURS
1	Introduction 1.1.Review of ocular anatomy & Physiology 12.Visual development	02
2	Pediatric case history 2.1.Genetic factors 2.2.Prenatal factors 2.3.Perinatal factors 2.4.Postnatal factors	01
3	Normal Appearance, pathology and structural anomalies of ✓ Orbit ✓ Eyelids ✓ Lacrimal system ✓ Conjunctiva ✓ Cornea ✓ Sclera ✓ Anterior chamber, Uveal tract, pupils ✓ Lens ✓ Vitreous, Fundus ✓ Oculomotor system	03
4	Ocular Examination 4.1.Measurement of visual acuity ✓ Various visual acuity charts for different age groups ✓ Teller acuity chart & VEP 4.2.Measurement of refractive status	06

	✓ Dry & Cycloplegic refraction ✓ Interpretation of results 4.3.Assessment of binocular status 4.4.Measurement of sensory motor adaptability 4.5. Assessment of accommodation &Convergence	
5	Post examination processes 5.1.Compensatory treatment & remedial therapy for ✓ Myopia ✓ Pseudomyopia ✓ Hyperopia ✓ Astigmatism ✓ Anisometropia ✓ Strabismus ✓ Nystagmus	04
6	Pediatric dispensing ✓ Spectacles ✓ Contact Lenses	04
		20 Hrs

RECOMMENDED BOOKS

1. Principles & Practice of pediatric optometry — Alfred Rosenboom, M.W.Morgan
2. Pediatric Optometry — Jerome Rosner
3. Clinical pediatric optometry — Leonard.J.Press- 1st edition

COMMUNITY OPTOMETRY

Sl. No	TOPICS	HOURS
1	Community Optometry 1. Global medicine and evolution of public health in India 2. Public health of optometry- concepts and implementation 3. Health care delivery systems in India and determinants of health Levels of prevention - optometrist's role in community 5. Concepts of national health programme 6. Screening in population 7. Epidemiology of blindness- cataract, glaucoma, deficiency disorders 8. Scope of geriatric ophthalmology in preventive and rehabilitation care 9. Natural history of disease, transmission of disease	20

	10. Basics in research methodology in populations 11. Demography and vital statistics 12. National and international agencies in health care 13. Fundamentals of health economics, health plan 14. Quality assessment in health delivery programmes, 15. Community outreach-camps and school screening programmes	
	OCCUPATIONAL OPTOMETRY	
1	1.1.ntroduction to occupational health, hygiene and safety 1.2.International bodies like IL0, WHO, national bodies like labour institutes, National institutes of occupational health, national safety council etc	20
2	Acts and rules, 2.1.factories act and rules 2.2.workmen's compensation act, ESI act etc	
3	Occupational diseases 3.1.occupation related diseases caused by ✓ Physical agents ✓ Chemical agents Biological agents	
4	Occupational hygiene & ergonomics 4.1.environmental monitoring 4.2.Recognition, evaluation and control of hazards 4.3.1lumination- definition, measurements and standards	
5	Occupational safety 5.1.causes of accidents 5.2. Accident analysis, accident prevention 5.2.vision, lighting, colour and their role 5.3.Problems of special occupational groups	
6	Ocular and visual problems of occupation 6.1.Electromagnetic radiation ✓ lonizing & Non ionizing ✓ Infrared ✓ Ultraviolet Microwave & laser	
7	Prevention of occupational diseases ✓ Medical examination /medical monitoring Pre-employment/pre-placement examinations	
8	Personal protective equipment ✓ Goggles, Face shields etc Selection, use & Testing for standards	
9	9.1.Work with visual display units-Computer 9.2.Contact lens & work 9.3.Pesticides- General & Ocular defects	

	9.4Role of optometrist - promotion of general and visual health and safety of people at Work 9.5. Industrial visits	
		40 Hrs

RECOMMENDED BOOKS

1. Public health and community Optometry — Robert.D.Newcomb, Jerry.L.Jolly
2. Industrial & Occupational ophthalmology — Samuel.L.Fox
3. Guide to occupational and other visual needs — Holmes
4. Work and the eye — Raechel.V.North
5. Diagnosing and treating computer related vision problems — Sheedy, Shaw-McMinn