Ordinance No. V-145 B

Bachelor Optometry (B.Optom)

Date of Academic Council meeting: 11.03.2026

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
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Department of Optometry
Subharti College of Allied and Healthcare
Faculty of Allied and Health Sciences
Swami Vivekanand Subharti University, Meerut

Subharti College of Allied and Healthcare
Principal
SVSU

Date of Academic Council Meeting- 11.03.2026

V-145-B

Ordinance No.....B

ORDINANCE RELATING TO BACHELOR OF OPTOMETRY (B Optom) PROGRAMME CURRICULUM AND SYLLABUS

1. This ordinance may be called the "**Ordinance relating to Bachelor of Optometry (B Optom) Curriculum and Syllabus**". This ordinance has been drafted in accordance with **National Commission for Allied and Healthcare Professions (NCAHP)** guidelines; all future updates issued by the NCAHP will be strictly implemented.
2. It shall come into force with academic session 2026-27.

Learning Objectives

1. Be able to develop skills to provide comprehensive eye examination.
    a. To acquire knowledge on ocular structures, its functions and pathological changes
    b. To carryout ophthalmic investigations
    c. To impart knowledge with regard to common eye diseases
    d. To impart knowledge on treatment modalities from the perspective of counselling
    e. To acquire knowledge about the referral guidelines for ocular and systemic conditions
2. Be able to correct refractive error and provide spectacle prescription
3. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
4. Be able to assess the low vision and provide comprehensive low vision care
5. Be able to have adequate knowledge to develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
6. Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery.
7. Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.
8. Have knowledge and skill for early detection of various ocular conditions and pathologies –Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
9. Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
10. Have knowledge on sensory substitution and other rehabilitation measures for totally visually challenged.
11. Have knowledge of counselling on visual/ocular hygiene, nutritional and environmental modifications

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PROGRAMME OUTCOMES (POs)

Upon successful completion of the B Optom programme, students will be able to:

POs	Outcome
PO 1	Optometrist will work independently or in conjunction with other eye/health care professionals.
PO 2	The optometrist will be knowledgeable, skilful and analytical in diagnosis, treatment planning, management of visual defects & impairments and in co-managements of ocular conditions.
PO 3	The optometrist can work in hospitals (both private and public sectors), optical outlets and/or work as independent practitioner.
PO 4	The course will lead to a basic degree in optometry, which is considered as the minimum essential for statutory registration of optometrists in countries where optometry has been brought under legislation.
PO 5	Undertake public health optometry projects and vision screening eye camps in schools, colleges, urban slums, rural areas and also practice occupational optometry in industries.
PO 6	Public education on ocular hygiene and related nutritional and environmental counselling.
PO 7	Offer a helping hand and or efficiently manage and successfully run any ophthalmic clinic, optometry department in hospitals, optical shops, and offer product expertise in ophthalmic industry & trade.

Bachelor of Optometry B Optom
Ist SEMESTER

General Anatomy

Theory	Subject Code: BOP101
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves and the entire central nervous system in particular.

Learning Objective: At the end of the semester, the student should be able to:

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1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
2. Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.

Course Plan:

Unit	Topic	Hours
I	**Introduction to Human Anatomy:** Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system Skeletal System	9
II	**Tissues of the Body:** Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues **Muscles:** Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply	9
III	**Blood vessels:** Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations **Lymphatic system:** Embryology, functions, relationship with blood vessels and organs	9
IV	**Skin and appendages:** Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves **Glands:** Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands	9
V	**Nervous system:** Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system **Brain and Cranial nerves:** Major parts of Brain, Protective	9

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	coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves.	
	Total	**45**

General Anatomy Practical

Practical	Subject Code: BOP101
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practical demonstration of each organ using specimen. If specimen for certain organs are not available, then videos can be shown to make the student understand the anatomic structures.

1. Study of anatomical plans and positions
2. Histological study of tissues
3. Study of Skeletal system
4. Study of respiratory system
5. Study of digestive system
6. Study of urinary system
7. Study of Cardiovascular system
8. Study of Nervous system
9. Study of sensory organs: eye, ear, nose, tongue and skin
10. Study of reproductive system

***Clinical laboratory rotation/observation can be incorporated wherever possible.**

Suggested Readings:

1. B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi - 110 032.
2. Inderbir Singh"s text book of Anatomy -3 volumes 7th Edition.
3. PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.
4. T.S. RANGANATHAN: Text book of Human Anatomy, 1982, S. Chand & Co., New Delhi 110 055.
5. INDERBIR SINGH: Human Embryology, 3rd Ed., Macmillan India, 1981.
6. R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

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General Physiology

Theory	Subject Code: BOP102
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neurophysiology.

Learning Objective: At the end of the course the student will be able to:

1. Explain the normal functioning of various organ systems of the body and their interactions.
2. Elucidate the physiological aspects of normal growth and development.
3. Describe the physiological response and adaptations to environmental stresses.
4. Know the physiological principles underlying pathogenesis of disease.

Course Plan:

Unit	Topic	Hours
I	**Cell structure & organization** Tissue organization, Epithelium, Connective tissue –Collagen fibers – Elastic fibers –Areolar fibers, Cartilage –Bone, Contractile tissue – striated –skeletal –cardiac –non striated –plain –myoepithelial, General principles of cell physiology, Physiology of skeletal muscle	7
II	**Blood** Composition, Volume measurement & variations, Plasma proteins – classification & functions, Red blood cells development, morphology & measurements –functions & dysfunctions., White blood cells – development –classification, morphology –functions & dysfunctions, Platelets –morphology development, functions & dysfunctions, Clotting –factors mechanism –anti- coagulants dysfunctions, Blood grouping classification –importance in transfusion, Rh factor & incompatibility, Suspension stability, Osmotic stability, Reticulo endothelial system: Spleen,lymphatic tissue, Thymus, bone marrow, immune system, cellular, Humoral, Autoimmune system	9
III	**Digestion**	9

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	General arrangement, functions & regulations: Salivary digestion, Gastric digestion, Pancreatic digestion, Intestinal digestion, Liver & bile, Absorption, Motility, Deglutition, Vomiting-Defecation-Functions of large intestine-Neurohumoral regulations of alimentary functions Excretion: Body fluids –distribution, measurement & exchange, Kidney –structure of nephron –mechanism of urine formation composition of the urine and abnormal constituents – urinary bladder & micturition	
IV	**Endocrines:** Hormone mechanism –negative feed backs –tropic action –permissive action –cellular action, hypothalamic regulation, hormones, actions, regulations: Thyroid, Adrenal cortex, Adrenal medulla, Parathyroid, Islets of pancreas, Miscellaneous, Common clinical disorders. **Reproduction:** Male reproductive system –control & regulation, Female reproductive system –uterus –ovaries –menstrual cycle regulation –*pregnancy & delivery –breast –family planning.* **Respiration:** Mechanics of respiration –pulmonary function tests – transport of respiratory gases- neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea–asphyxia.	**10**
V	**Circulation:** General principles Heart: myocardium –innervation – transmission of cardiac impulse- Events during cardiac cycle –cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure measurements –factors regulation variations –capillary circulation –venous circulation. Special circulation: coronary cerebral miscellaneous **Nervous system:** Neuron –Conduction of impulse –synapse receptor, Sensory organization –pathways and perception, Reflexes –cerebral cortex –functions, Thalamus –Basal ganglia, Cerebellum., Hypothalamus, Autonomic nervous system –motor control of movements, posture and equilibrium, conditioned reflex, eye hand co-ordination, Special senses –(Elementary) Olfaction –Taste – Hearing	**10**
	Total	**45**

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General Physiology Practical

Practical	Subject Code: BOP102
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Blood test: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time.
2. Digestion: Test salivary digestions.
3. Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts.
4. Endocrinology and Reproduction: Dry experiments in the form of cases showing different endocrine disorders.
5. Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding test 65 | Page "Curriculum of Optometry (Intellectual Property of the National Commission for Allied and Healthcare Professions, Ministry of Health and Family Welfare)."
6. Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate.
7. Central Nervous System: Sensory system, Motor system, Cranial system, Superficial and deep reflexes *Videos can be shown to make the student understand the functions

***Clinical laboratory rotation/observation can be incorporated wherever possible.**

Suggested Readings:

1. Human physiology - C C Chatterjee 14th edition
2. 2 volumes 2. Essentials of human physiology - K Sembulimgam 8th edition.
3. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan.
4. G J Tortora, B Derrickson: Principles of anatomy & physiology,11th edition, Harper & Row Publishers, New York.
5. John Wiley & Sons Inc, New Jersey, 2007

General Biochemistry

Theory	Subject Code: BOP103
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course will be taught in two consecutive semesters. General Biochemistry deals with the biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the required aim of this course.

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Learning Objective: At the end of the course, the student should be able to: demonstrate his knowledge and understanding on:

1. Structure, function and interrelationship of biomolecules and consequences of deviation from normal.
2. Integration of the various aspects of metabolism, and their regulatory pathways.
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

Course Plan:

Unit	Topic	Hours
I	Amino acids - classification, symbols, structures and properties - Proteins – primary structure, secondary structure, tertiary structure and quaternary structure - examples with biological functions Carbohydrates - classification, structure and functions of mono-, di, oligo- and polysaccharides - Glycoconjugates - proteoglycans, glycoproteins and glycolipids Lipids - structure and functions of fatty acids, triacylglycerols, phospholipids and glycolipids	9
II	Enzyme nomenclature - derivation of Michaelis-Menten equation, significance and its limitations, Lineweaver-Burk equation and its plot - factors affecting the rate of enzymatic reactions - enzyme regulation - covalent modification, allosteric modification, positive and negative co-operativity - enzyme inhibition - reversible and irreversible inhibitions. Mechanism of enzyme catalysis - proximity effect, general acid-base reaction, electrostatic interaction, etc., that recurs in enzyme reactions; mechanism of action of chymotrypsin, lysozyme, ribonuclease-A and carboxypeptidase	9
III	Carbohydrate metabolism - glycolysis (aerobic and anaerobic), feeder pathways of glycolysis, gluconeogenesis, glycogenolysis, glycogenesis, pyruvate oxidation, TCA cycle, glyoxylate cycle and pentose phosphate pathway - pathway, control and energetics Nucleic acids metabolism - Purines and Pyrimidines- synthesis, degradation and its control	9
IV	Amino acids metabolism - transamination, oxidative deamination, urea cycle, breakdown of amino acids leading to pyruvate, acetyl CoA, α-ketoglutarate and succinyl CoA – lipids metabolism - fatty acids, phospholipids and cholesterol - synthesis, degradation and its	9

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	control	
V	Electron transport chain and its complexes; oxidative phosphorylation: chemiosmotic theory; proton motive force, ATP synthesis - rotational catalysis; uncouplers of oxidative phosphorylation; control of ATP production	9
	Total	**45**

General Biochemistry Practical

Practical	Subject Code: BOP103
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Estimation of amino acid by Formol titration
2. Estimation of starch by Anthrone method
3. Estimation of protein by Lowry"s method from germinating seeds
4. Estimation of cholesterol by Zak"s method
5. Estimation of amino acid by Ninhydrin method from germinating seeds
6. Estimation of ascorbic acid
7. Estimation of Urea by DAM-TSC method
8. Determination of enzyme activity – AST
9. Determination of enzyme activity – ALT
10. Identification of amino acids by descending paper chromatography.
11. Identification of sugars by TLC
12. Demonstration
13. Estimation of blood cholesterol
14. Estimation of alkaline phosphatase.
15. Salivary amylase (effect of PH, etc)

***Clinical laboratory rotation/observation can be incorporated wherever possible.**

Suggested Readings:

1. Essentials of biochemistry - Shivananda Nayak 3rd edition
2. Textbook of biochemistry for medical students - D M Vasudevan 8th edition

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Physical Optics

Theory	Subject Code: BOP104
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course will be taught in one semester. Physical Optics is the study of light, its properties and its interaction with matter. Specifically, the phenomena of interference, diffraction, polarization and scattering will be dealt with in detail.

Learning Objective: The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

Course Plan:

Unit	Topic	Hours
I	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase. Sources of light; Electromagnetic Spectrum, Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units. Inverse square law of photometry; Lambert‟s law. Other units of light measurement; retinal illumination; Trolands	9
II	INTERFERENCE: Interference of Light – Principle of Super Position - Coherence, Coherent, sources, Constructive interference, Destructive interference - Young‟s double slit Experiment– band width – Colors of Thin Films – Newton‟s Rings – Determination of Wavelength – Air wedge - Determination of diameter of a thin wire by air wedge Michelson‟s Interferometer and its Applications.	9
III	DIFFRACTION: Fresnel's Diffraction – Zone Plate and a Convex Lens – Diffraction at Circular aperture, Opaque circular disc, Straight edge and Narrow wire -. Fraunhofer's Diffraction – Diffraction at a Slit, Circular Aperture and Disc – Theory of Plane Transmission Grating. Resolution of Images – Rayleigh‟s Criterion – Resolving Power of Telescope, Microscopes, Prisms and Grating.. Scattering; Raleigh‟s scattering; Tyndall effect.	9
IV	POLARIZATION: Double Refraction – Brewster‟s Law – Nicol Prism — polarizer and analyzer - Huygens Explanation of double	9

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	refraction – Elliptically & Circularly polarized light – Quarter Wave and Half Wave Plates - Polaroids and their uses -Optical Activity – Fresnel"s Explanation – Bi quartz Polarimeter – Determination of Specific Rotatory Power using Half Shade Polarimeter. Fluorescence and Phosphorescence- Introduction to Fluorescence and Phosphorescence, Applications of Fluorescence	
V	LASERS: Introduction –Basic Principle of LASER – spontaneous and stimulated emission, Coherence –Population Inversion – Different Types of Pumping –Systems – characteristics of LASER . Types of Laser: He-Ne Laser – Nd YAG laser – CO2Laser – Semiconductor Laser - 3-D Profiling Using Lasers – Applications of Laser in Field of Medicine – ophthalmic applications.	9
	Total	**45**

Physical Optics Practical

Practical	Subject Code: BOP104
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

The practical to be done include the following:

1. Determination of Refractive Index of the given Liquid – Newton"s Ring
2. Refractive Index of Hollow Prism
3. Small Angle Prism
4. Resolving Power of Prism
5. Polarimeter - Specific Rotation
6. Diffraction using Single Slit and Double Slit - determine its width.
7. Determination of Wavelength of He-Ne - Laser Grating
8. Michelson"s Interferometer - determine the wavelength
9. Circular Aperture - Airy disk, dependence of disk diameter on aperture size
10. Verification of Malus" Law using a polarizer – analyzer combination
11. Thickness of thin glass plate Michelson"sInterferometer
12. Photometry of Images: Verification of Inverse Square Law; Effect of aperture size on image illuminance

***Clinical laboratory rotation/observation can be incorporated wherever possible.**

Suggested Readings:

Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.

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Mathematics & Geometrical Optics-I

Theory	Subject Code: BOP105
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: Mathematics deals with the basics that are necessary for understanding the concepts of vision. Geometric Optics is the study of light and its behavior as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

Learning Objective: The objective of the mathematics units is to introduce the basic principles of mathematics involved in optometry, optics and other applied diagnostic divisions of optometry. The objective of the geometric optics units is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to prédict the basic properties of the images formed on the retina by the optics of the eye.

Course Plan:

Unit	Topic	Hours
I	Trigonometry: Complex numbers, DeMoivre‟s Theorem and important deductions, Trigonometric and exponential forms of complex numbers and applications. Expansion of sinq, cosq and tanq in terms of q. Algebra: Combinations; Binomial theorem for any index	9
II	Definition of scalars, vectors and matrices. Addition and subtraction of vectors and matrices; vector norm and matrix determinants. Dot and cross products; angle between vectors. Multiplication of two matrices. Inverse of matrices; solution of simultaneous linear equations using matrices. Concepts of groups, rings and vector spaces. Definition of linearity and applications	9
III	Wavefronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance. Refractive index; its dependence on wavelength. Fermat‟s and Huygen‟s Principle –Derivation of laws of	9

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	reflection and refraction (Snell"s law) from these principles	
IV	Plane mirrors –height of the mirror; rotation of the mirror, Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation, Imaging by concave mirror, convex mirror, Reflectivity; transmissivity; Snell"s Law, Refraction at a plane surface, Glass slab; displacement without deviation; displacement without dispersion	**9**
V	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism, angular dispersion; dispersive power; Abbe"s number, Definition of crown and flint glasses; materials of high refractive index, Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index	**9**
	Total	**45**

Mathematics & Geometrical Optics-I Practical

Practical	Subject Code: BOP105
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index.
2. Thin Prism – measurement of deviation; calculation of the prism dioptre.
3. Fresnel"s Biprism - determine the wavelength of a monochromatic light source.
4. Refractive Index of Solid Prism.
5. Image formation by spherical mirrors.

***Clinical laboratory rotation/observation can be incorporated wherever possible.**

Suggested Readings:

1. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

2. B. S. Grewal, Higher Engineering Mathematics, 43/e, Khanna Publishers, 2014.

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Introduction to Optometry

Theory	Subject Code: BOP106
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Course Description: This course aims to orient the students with basic concepts of optometry, highlighting its role and importance in comprehensive ocular evaluation.

Learning Objective:

1. This course provides the students with basic knowledge on optometry, its disciplines, and its importance in enabling comprehensive ocular evaluation.
2. The course introduces the various roles that optometrists can play in terms of clinical, community, academic and research services and how different courses in the curriculum enable them towards achieving this objective.

Course Plan:

Unit	Topic	Hours
I	Introduction to optometry, Definition, Rights and Responsibilities Integration of basic sciences and support courses to Optometry Role of optometry in comprehensive eye care.	10
II	Introduction to Primary eye care, Blindness, Vision impairment, Refractive errors, common ocular diseases like cataract, diabetic retinopathy, glaucoma Disciplines in Optometry: Binocular vision, Contact lens, Low vision care, Occupational optometry and Sports Optometry etc.	10
III	Background of the profession: Allied and Health care Profession, Systems and streams of different professions and the position of optometry Evolution of optometry in India Global practice trends of optometry What does it take to become a healthcare professional?	10
	Total	30

Suggested Readings:

J. Boyd Eskridge, John F. Amos, Jimmy D. Bartlett, Clinical Procedures in Optometry

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Nutrition

Theory	Subject Code: BOP107
Total Marks for Evaluation-100	No. of Contact Hours-15, Credits:1

Course description: This course covers the basic aspects of Nutrition for good health. It also includes nutrients and nutrient derivatives relevant to ocular health, nutrition deficiency and ocular disease, Nutrition and ocular aging, and contraindications, adverse reactions and ocular nutritional supplements.

Learning Objective: At the end of the course student would have gained the knowledge of the following:

1. Balanced diet.
2. Protein, carbohydrates, vitamins, Minerals, carotenoids and eye.
3. Nutrition and Ocular aging
4. Adverse effects of ocular nutritional supplements.

Course Plan:

Unit	Topic	Hours
I	Introduction: Food groups, RDA, Balanced diet, diet planning. Assessment of nutritional status. Energy: Units of energy, Measurements of energy and value of food, Energy expenditure. Total energy/calorie requirement for different age groups and diseases. Satiety value, Energy imbalance- obesity, starvation. Limitations of the daily food guide. Nutrients and Nutrient derivatives relevant to ocular health: Proteins, Lipids, carbohydrates, vitamins, minerals and trace elements, carotenoids, oxidative stress and the eye.	5
II	Nutrition deficiency and ocular disease: Vitamin A deficiency, Vitamin C deficiency and ocular disease, Vitamin E deficiency, retinitis pigmentosa.	5
III	Nutrition and Ocular Senescence: Nutrition and malnutrition in older people, Dry eye disorders, Glaucoma, Cataract, and Age related macular degeneration. Contraindications, adverse reactions and ocular nutritional supplements. Recent Advance in research into nutrition related eye health: Age related eye disease study (AREDS), Carotenoids in Age related eye disease study (CAREDS),	5
	Total	**15**

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Communication

Theory	Subject Code: BOP108
Total Marks for Evaluation-50	No. of Contact Hours-15, Credits:1

Course Description: This course deals with essential functional English aspects and nuances of the communication skills essential for the health care professionals.

Learning Objective:

1. This course trains the students in oral presentations, expository writing, logical organization and structural support.
2. By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, develop poise and confidence and achieve success.

Course Plan:

Unit	Topic	Hours
I	Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words, Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms. Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension, Summary writing, Creative writing, newspaper reading. Importance of speaking efficiently, Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling	5
II	Communication process, Elements of communication, Barriers of communication and how to overcome them. Nuances for communicating with patients and their attenders in hospitals.	5
III	Listening Process, Barriers to Listening, Types of Listening, Importance of listening, Good and persuasive listening, Characteristics of a good listener. Efficient and fast reading, Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study. Basics of non-verbal communication, Rapport building skills using neuro- linguistic programmeming (NLP)	5

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	Total	**15**

Suggested Readings:

Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.

Communication Practical

Practical	Subject Code: BOP108
Total Marks for Evaluation-50	No. of Contact Hours-60, Credits:2

The practical to be done include the following:

1. Listening comprehension
2. Listening and Note-taking
3. Training in Listening
4. Professional speaking
5. Audience Analysis
6. Organizing a speech
7. Delivering a speech: Presentation Strategies
8. Interview Techniques
9. Group Discussion
10. Professional writing
11. Trans-coding -- from verbal to visual & from visual to verbal
12. Editing, Proof reading, Referencing Michelson"s Interferometer - determine the wavelength
13. Proposals
14. User manual and Product description
15. Reports – feasibility, market survey, project
16. Conference paper/journal article writing in IMRAD Format
17. Memos and E-mails
18. Advertisement Writing
19. Scenarios in Optometric Practice (Role play)
20. As Clinicia
21. As Patient
22. As Parent/ attendant
23. Non-verbal communication

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Clinical Optometry-I

Practical	Subject Code: BOP109
Total Marks for Evaluation-100	No. of Contact Hours-60, Credits:2

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Course Description: *This course deals with introducing the students to the optometric clinical* rotations in a clinic or a hospital.

Learning Objective:

1. The objective is to introduce the student to the working of a clinic/ hospital.
2. To introduce different departments in a hospital/non-optometry service in a clinic.

COURSE PLAN

1. Observe the basic operations of the optometry clinic while interacting with the team members involved in providing optimal care to patients.
2. Setting up of an optometric work up room
3. Introduction to relevant terminologies, equipment and techniques used for treatment.
4. Tour the hospital and get to know other departments in a tertiary eye care hospital and provide a report on the observation
5. Coverage on the process of the clinic/ hospital, creating and maintaining medical records (electronic),
6. Processes and guidelines in the Human resources department during the studentship along with the roles and responsibilities of the students,
7. Observation in clinical and non-clinical processes of the Optometry/Opticals Department. Depending on the availability of the other departments like Disposals of the medical and non-medical waste in the system, Department of Bioengineering, Patient services, eye banks, multimedia/ Web development etc observations can be encouraged.
8. Basic Life Support Skills Training.
9. Observation at the Hospital infection control and Safety and the Quality Control System.
10. Training on basic clinical protocol for community outreach.

IInd SEMESTER

General Pharmacology

Theory	Subject Code: BOP201
Total Marks for Evaluation-100	No. of Contact Hours-45, Credits:3

Course description: This course covers the actions, uses, adverse effects and mode of administration of drugs.

Learning Objective: At the end of the course the students will acquire knowledge in the following aspects-

1. Basic principle of pharmacokinetics & Pharmacodynamics.

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2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

Course Plan:

Unit	Topic	Hours
I	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	15
II	Systemic Pharmacology: Autonomic nervous system, Cardiovascular system: Anti-hypertensive and drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, Depressants. Histamines and Anti histamines, Serotonin, Prostaglandin	10
III	General & local anaesthetics, Opioids & non-opioids; Chemotherapy :Introduction on general chemotherapy, Specific chemotherapy – Antiviral, antifungal, antibiotics; Hormones: Corticosteroids, Antidiabetics; Blood Coagulants	10
IV	Principles and classification of autonomic drugs, Sympathomimetics – Sympatholytics, Parasympathomimetics – Parasympatholytics, Diagnostic use of autonomic drugs, Sulfonamides, Antibiotics, Anaesthetics-Proteolytic enzymes	10
	Total	45

General Pathology

Theory	Subject Code: BOP202
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Course description: This course describes basic aspects of disease processes with reference to specific entities relevant in optometry/ophthalmology.

Learning Objective: At the end of the course students will acquire knowledge in the following aspects:

1. Inflammation and repair aspects.
2. Pathology of various eye parts and adnexa.

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Course Plan:

Unit	Topic	Hours
I	Modes of cell injury, Necrosis & gangrene, Inflammation and repair (Chronic and Acute), Infection in general, Specific infections: Tuberculosis, Leprosy, Syphilis, Fungal infection, Viral, chlamydial infection	15
II	Neoplasia, Haematology, Anemia, Leukemia, Bleeding disorders. Circulatory disturbances: Thrombosis, Infarction, Embolism, Hypersensitivity reactions	10
III	Clinical pathology: Immune system, Shock, Anaphylaxis, Allergy	05
	Total	30

Suggested Readings:

1. Textbook of pathology - Harsh Mohan 8th edition

Ocular and Related Neuro Anatomy

Theory	Subject Code: BOP203
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course description: This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions.

Learning objectives: At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
4. To understand the basic principles of ocular embryology.

Course Plan:

Unit	Topic	Hours
I	Ocular Embryology. Ocular Structures: Eyeball, Visual pathway, orbit, extraocular muscles and appendages. Ocular Embryology. Eyebrows: Gross anatomy, structure, vessels and nerves, functions.	9

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	Orbit: Bony orbit, periorbita, orbital fascia, surgical spaces in the orbit, orbital fat and reticular tissue, apertures at the base of orbit, contents of the orbit; Paranasal sinuses. Anatomy of eyelids: Gross, structure, Glands of eyelids, vessels and nerves. Extraocular muscles: rectus, oblique, nerve supply, blood supply.	
II	Conjunctiva: Parts of conjunctiva, Structure of conjunctiva, the conjunctival glands, Plica semilunaris, the caruncle, Blood supply of the conjunctiva, venous drainage of conjunctiva, lymphatics of the conjunctiva, nerve supply of conjunctiva. Cornea: Dimensions, histology, blood supply, nerve supply, Limbus: Anatomical limbus, surgical limbus, cataract incision; Sclera: Thickness of sclera, special regions of the sclera, scleral apertures, microscopic structure, nerve supply, Uvea: iris, ciliary body choroid, blood supply; Aqueous Humour: Ciliary body, posterior chamber, anterior chamber, angle of the anterior chamber, Gonioscopic grading of the angle, Aqueous outflow system	**9**
III	The crystalline lens: structure of the lens, ciliary zonules. Vitreous Humour: general features, Structure (Hyaloid membrane, cortical vitreous, medullary vitreous), attachments, vitreous base. Retina and Visual Pathway : Gross anatomy of retina, microscopic structure, blood-supply of retina, blood retinal barrier; Anatomy of different components of visual pathway, arrangement of nerve fibres, blood supply, lesions of visual pathway.	**9**
IV	Lacrimal apparatus: Lacrimal glands (main and accessory; structure, blood supply, lymphatic drainage, nerve supply), Lacrimal passages (Puncta, canaliculi, lacrimal sac, nasolacrimal duct, blood supply, nerve supply). Tear film: Functions, structure (all layers), Physical properties, Chemical composition (water, proteins, metabolites, electrolytes, and lipids). Blood vessels and ocular circulations: Blood vessels – arteries and venous drainage; Ocular circulation – structural characteristics of ocular vessels. Orbital Nerves: Oculomotor, trochlear, abducent, trigeminal, facial, autonomic nerves	**9**
V	Central nervous system: Spinal cord and brain stem, Cerebellum, Cerebrum. Nervous system: Neuron –Conduction of impulse – synapse –receptor, Sensory organization –pathways and perception, Reflexes cerebral cortex –functions. Thalamus –Basal ganglia, Cerebellum, Hypothalamus, Autonomic nervous system –motor	**9**

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	control of movements, posture and equilibrium, Conditioned reflex, eye hand co-ordination	
	Total	**45**

Ocular and Related Neuro Anatomy Practical

Practical	Subject Code: BOP203
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Practical demonstration of bovine eye dissection.
2. Retina Layers - Video Demonstration and OCT
3. Cranial Nerve Examination
4. Meibomian glands using meibography
5. Syringing to understand lacrimal apparatus

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Anatomy and Physiology of Eye, Second edition, By: AK Khurana, Indu Khurana: CBS Publishers, New Delhi, 2006

Ocular and Related Neurophysiology

Theory	Subject Code: BOP204
Total Marks for Evaluation-80	No. of Contact Hours- 45, Credits:3

Course description: Ocular physiology deals with the physiological and neurological functions of each part of the eye.

Learning Objective: At the end of the course, the student should be able to:

1. Explain the normal functioning of all structures of the eye and their interactions
2. Elucidate the physiological aspects of normal growth and development of the eye
3. Understand the phenomenon of vision
4. List the physiological principles underlying pathogenesis and treatment of diseases of the eye

Course Plan:

Unit	Topic	Hours

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I	Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe , Extrinsic eye muscles, their actions and control of their movements, Coats of the eye ball, Ocular, movements and saccades	**9**
II	Cornea, Aqueous humor and vitreous: Intra ocular pressure, Iris and pupil, Crystalline lens and accommodation – presbyopia, Mechanism of accommodation, Retina – structure and functions	**9**
III	Vision – general aspects of sensation, Pigments of the eye and photochemistry, The visual stimulus, refractive errors, Visual acuity, Vernier acuity and principle of measurement, Visual perception – Binocular vision, stereoscopic vision, optical illusions	**9**
IV	Visual pathway, central and cerebral connections, Introduction to electro physiology, Retinal sensitivity and Visibility, Receptive stimulation and flicker	**9**
V	Colour vision and colour defects. Theories and diagnostic tests, Scotopic and Photopic vision, Color vision, Color mixing, Visual perception and adaptation, Introduction to visual psychology (Psychophysics)	**9**
	Total	**45**

Ocular and Related Neurophysiology Practical

Practical	Subject Code: BOP204
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Examination of Lid movements and Extra ocular movements
2. Tests for lacrimation
3. Experiments on Binocular vision(Accommodation, Vergence, Disparity, Single Vision, Fusion & Stereopsis)
4. Examination of Pupillary reflexes
5. Experiments on Light and dark adaptation
6. Experiments on Colour Vision

***Clinical laboratory rotation/observation can be incorporated wherever possible**

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Suggested Readings:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
2. L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005

Ocular Biochemistry

Theory	Subject Code: BOP205
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course description: Ocular Biochemistry deals with the metabolism that takes place in the human body. It also deals with ocular biochemistry in detail. Clinical estimation as well as the clinical significance of biochemical values is also taught.

Learning Objective: At the end of the course, the student should be able to demonstrate his knowledge and understanding on

1. Structure, function and interrelationship of biomolecules and consequences of deviation from the normal.
2. Integration of various aspects of metabolism and their regulatory pathways.
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.
4. Understand metabolic processes taking place in different ocular structures.

Course Plan:

Unit	Topic	Hours
I	Importance of ocular biochemistry in ophthalmic practice; Tear film – Functions of Tear film. Different layers of Tear film. Chemical composition of tears. Tear film abnormalities. Tests for film Adequacy, Cornea – Biochemical composition of cornea. Sources of Nutrients-Oxygen, Glucose, Amino acid. Metabolic pathway in cornea – Glycolysis, HMP shunt	9
II	Lens – Biochemical composition of lens. Lens protein – their types & characteristics. Lens Metabolism - Carbohydrate metabolism, protein metabolism. Cataract – Due to biochemical defects of lens. Antioxidant mechanism in the lens	9
III	Retina – structure – composition – photoreceptor cell – metabolism and functions – phagocytosis; Retinal neurochemistry – Monoamines	9

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	– acetylcholine – GABA – amino acids – taurine – neuropeptides – Biochemical correlates of retinal diseases	
IV	Biochemistry of the visual process; Photopigments – Rhodopsin & Iodopsin. Chemical nature of Rhodopsin. Visual cycle (Bleaching of Rhodopsin, Transducin cycle, Role of Phosphodiesterases)	**9**
V	Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research.	**9**
	Total	**45**

Ocular Biochemistry Practical

Practical	Subject Code: BOP205
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

1. Quantitative and qualitative analysis by spectrophotometry.
2. Electrophoresis o Chromatography – Lysozyme, Lactoferin, IgA etc.
3. Preparation of normal, molar and percentage solutions – matching Tear Osmolarity.
4. Measurement of tear osmolarity
    - Preparation of buffers, pH determination.
5. pH estimation of tears.
6. Biochemistry Assay using following specimens
    - Tears of different age groups.
    - Cataract lens
    - Different types of used contact lenses
    - Contact lens solutions on tears
    - Demonstration of various techniques as given in unit 5.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

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Geometrical Optics-II

Theory	Subject Code: BOP206
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course description: This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behavior as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

Learning Objective: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Course Plan:

Unit	Topic	Hours
I	Vergence and vergence techniques revised. Gullstrand"s schematic eyes, visual acuity, Stile Crawford. Emmetropia and ametropia	10
II	Blur retinal Imaginary, Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic. Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.	15
III	Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification. Aperture stops- entrance and exit pupils. Aberrations Spherical – Coma - Oblique astigmatism - Curvature of the field – Distortion - Chromatic (longitudinal and lateral) - higher order aberrations.	10
IV	Telescopes and Microscopes, Accommodation Accommodation formulae and calculations. angular magnification of spectacle lens, near point, calculation of add, depth of field.	10
	Total	45

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Geometrical Optics-II Practical

Practical	Subject Code: BOP206
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

1. Image formation with Cylindrical Lenses, Imaging by two cylinders in contact
2. Image formation with spherocylindrical lens – sphere and cylinder in contact
3. Calculation of Spectacle and Relative Spectacle Magnification
4. Construction of a tabletop telescope – all three types of telescopes.
5. Construction of a tabletop microscope
6. Demonstration of Aberrations

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
2. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

Basics of Computers

Theory	Subject Code: BOP207
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:1

Course Description: The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

Learning Objective: The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.

COURSE PLAN

1. Introduction to computer: Input and output devices: Processor and memory: The Central Processing Unit (CPU), main memory. Storage Devices, Introduction of windows, Introduction of Operating System
2. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

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3. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
4. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
5. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), Internet and its Applications.
6. Introduction to computer applications in health and hospital data management system.

Clinical Optometry-II

Practical	Subject Code: BOP208
Total Marks for Evaluation-100	No. of Contact Hours-60, Credits:2

Students will observe the basic operations of the optometry clinic while interacting with the multidisciplinary team members involved in providing optimal care to patients. The student will be introduced to optical terminology, equipment, and techniques used for treatment. Students will maintain a log of all the cases seen in the outpatient department. Students will be given hands on training on basic optometry procedures such as history taking, vision testing, basic binocular vision testing and other ancillary procedures that are part of a comprehensive eye examination.

Course Plan

History Taking in systemic conditions and its relevant ocular implications

1. General medications and its systemic conditions
2. Interpretation of lab reports: Blood reports, urine reports, endocrinology reports
3. Estimation of random blood sugar 5. Estimation of Blood Pressure and pulse rate
4. Demonstration of CPR
5. Clinical Assessment of cranial nerve functions
6. Visual Acuity tests for adult and children
7. Basic Binocular Vision tests
8. Tear film and lid assessment

***Clinical laboratory rotation/observation can be incorporated wherever possible**

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IIIrd SEMESTER

General and Ocular Microbiology

Theory	Subject Code: BOP301
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course covers the basic biological, biochemical and pathogenic characteristics of pathogenic organisms.

Learning Objective: The objectives of the course are:

1. To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites.
2. To acquire knowledge of the principles of sterilization and disinfection in hospital and ophthalmic practice;
3. To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections.
4. To understand basic principles of diagnostic ocular Microbiology.

Course Plan:

Unit	Topic	Hours
I	Introduction to Microbiology: History and scope of Medical Microbiology; Prokaryotic Cell structure and functions; Eukaryotic Cell structure and functions; Overview of Bacteriology, Mycology, Virology and Protozoology; Ocular microbiology - Normal ocular flora; Control of Microbial Growth - Antimicrobial methods and Chemotherapy; Basic Laboratory techniques.	9
II	Sterilization in ophthalmic practice: Heat (dry & wet heat – steam under pressure autoclaving), radiation, filter, chemicals; control of efficacy of sterilization. Disinfection procedure - glutaraldehyde (2%), chlorhexidine, alcohol, iodine; preventive methods – hand washing, needle stick/slash policy; methods to disinfect tonometer and Slit lamp biomicroscope; Preventative method in operation theatre – attire, caps & masks, hand washing, cleaning procedure.	9
III	Ocular Immunology: Innate and adaptive immunity; Hypersensitivity responses - Anaphylactic hypersensitivity, cytotoxic hypersensitivity, Complex-mediated hypersensitivity, Delayed hypersensitivity; Autoimmunity; Host parasite relationship.	9

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IV	Ocular Bacteriology: Ocular Bacterial diseases, Pathological mechanisms, Immunity, Laboratory diagnosis Ocular Mycology: Ocular Mycotic diseases, Laboratory diagnosis Ocular Virology: Ocular Viral infections, Immunity, Laboratory diagnosis; Ocular Parasitology: Acanthameba, Toxoplasma, Onchocerciasis, Toxocariasis, Cysticercus cellulosae (larval form of Taenia solium), Phthiriasis	9
V	Hospital borne ocular infections: postoperative endophthalmitis, conjunctivitis, infections transmitted through corneal transplantations, hepatitis, HIV; high risk areas and staff; preventive methods, AIDS protocol, infective waste disposal	9
	Total	**45**

General and Ocular Microbiology Practical

Practical	Subject Code: BOP301
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Sterilization & Disinfection procedures and quality control.
2. Collection of specimens from conjunctiva, lid margin (using sterile cotton swabs), Specimen processing.
3. Isolation & Purification of microbes from collected specimens
4. Characteristic growth on different culture media
5. Characterization & Identification · Staining – Gram staining, Acid fast staining, Spore Staining, Flagella staining · Motility – Hanging drop method · Biochemical tests · Antibiotic sensitivity test.
6. Isolation and identification of various fungal strains in the laboratory.
7. Video demonstration of collection of specimen from cornea intraocular specimens (Aqueous humor and Vitreous aspirate) processing and reporting on bacterial and fungal cultures and reporting.
8. Lab tour/ orientation to the PCR facility in diagnosis of ocular infections.
9. Impression Cytology of conjunctiva

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

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1. Textbook of microbiology - Ananthanarayan and Paniker 11th edition

Ocular Pharmacology

Theory	Subject Code: BOP302
Total Marks for Evaluation-100	No. of Contact Hours-45, Credits:3

Course Description: This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

Learning Objective: At the end of the course the students will acquire knowledge in the following aspects-

1. Basic principle of pharmacokinetics & Pharmacodynamics
2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

Course Plan:

Unit	Topic	Hours
I	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent. Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	9
II	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs	9
III	Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial infections	9
IV	Pharmacotherapy of Drugs used in allergic, inflammatory & degenerative conditions of the eye	9
V	Pharmacotherapy of Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes, Antioxidants	9
	Total	**45**

Suggested Readings:

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1. Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996
2. T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott Raven, 1997

Visual Optics-I

Theory	Subject Code: BOP303
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course deals with the concept of eye as an optical instrument and thereby covers various optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

Learning Objective: Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

Course Plan:

Unit	Topic	Hours
I	Review of Geometrical Optics: Vergence and power. Conjugacy, object space and image space, Sign convention, Spherical refracting surface, Spherical mirror; catoptric power, Cardinal points, Magnification, Light and visual function, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism. Aberration and its application Spherical and Chromatic aberration	10
II	Optics of Ocular Structure: Cornea and aqueous, Crystalline lens, Vitreous, Schematic and reduced eye	10
III	Measurements of Optical Constants of the Eye, Corneal curvature and thickness, Keratometry, Curvature of the lens and ophthalmophakometry Axial and axis of the eye, Basic Aspects of Vision. Visual Acuity, Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution, Science of Measuring visual performance and application to Clinical Optometry	10

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IV	Refractive anomalies and their causes, Etiology of refractive anomalies Contributing variability and their ranges, Populating distributions of anomalies. Optical component measurements. Growth of the eye in relation to refractive errors	**15**
	Total	**45**

Visual Optics-I Practical

Practical	Subject Code: BOP303
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

1. Study of Purkinje images I to IV.
2. Measurement of corneal curvature.
3. Measurement of corneal thickness.
4. Mathematical models of the eye - emmetropia, Hyperopia, Myopia
5. Conjugate points - demonstration - worked examples.
6. Axial and refractive ametropia - hyperopia, myopia - worked examples.
7. Construction of Visual acuity charts

***Clinical laboratory rotation/observation can be incorporated wherever possible.**

Suggested Readings:

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987.
2. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998 3. T Grosvenor: Primary Care Optometry,4th edition, Butterworth heinneman, USA, 2002.

Optometric Optics

Theory	Subject Code: BOP304
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when

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and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect.

Learning Objective: Skills/knowledge to be acquired at the end of this course:

1. Measurement of lens power, lens centration using conventional techniques
2. Transposition of various types of lenses Knowledge to identify different forms of lenses (equi- convex, plano convex, periscopic, etc.)
3. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
4. Knowledge lens designs –single vision, bifocals, progressive lens
5. Knowledge on tinted and protective lenses

Course Plan:

Unit	Topic	Hours
I	Introduction –Light, Mirror, Reflection, Refraction and Absorption. Lenses –Definition, units, terminology used to describe, form of lenses Vertex distance and vertex power, Effectivity calculations	9
II	Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical Transpositions –Simple, Toric and Spherical equivalent, Surfacing of spherical and cylindrical lenses	9
III	Spherometer & Sag formula, Edge thickness calculations, Manufacturing of lenses, Inspection of Lenses	9
IV	Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel"s prisms, rotary prisms. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Spherocylinder lenses	9
V	Lens Designs: Single Vision, Bifocals and Multifocal Lenses. Tints and Protective Lenses, Special design lenses, Aberration in Ophthalmic Lenses	9
	Total	**45**

Optometric Optics Practical

Practical	Subject Code: BOP304

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Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Lens curvature and refractive index calculation with lens gauge, Lens material, design selection
2. Lensometry (Single vision, Bifocal and Progressives, prism spectacles)
3. Identification of lens defects
4. Identification of tints, safety eyewear, and special lenses
5. Demonstration of newer design lenses
6. Visit to manufacturing lab set up to demonstrate surfacing of lenses.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.

Ocular Diseases-I

Theory	Subject Code: BOP305
Total Marks for Evaluation-100	No. of Contact Hours-45, Credits:3

Course Description: This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

Learning Objective: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases:

1. Etiology
2. Epidemiology
3. Symptoms
4. Signs
5. Course sequelae of ocular disease
6. Diagnostic approach and
7. Management of ocular diseases.

Course Plan:

Unit	Topic	Hours

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I	**Orbit:** Applied Anatomy, Proptosis (Classification, Causes, Investigations) Enophthalmos, Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome) Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis) Grave"s Ophthalmopathy, Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma), Orbital blowout fractures, Orbital surgery (Orbitotomy), Orbital trauma , Approach to a patient with proptosis	7
II	**Lids:** Applied Anatomy, Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos) Oedema of the eyelids (Inflammatory, Solid, Passive edema) Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Interalhordeolum, Molluscum Contagiosum) Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis). Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)	6
III	**Lacrimal System:** Applied Anatomy, Tear Film, The Dry Eye (Sjogren"s Syndrome), The watering eye (Etiology, clinical evaluation), Dacryocystitis, Swelling of the Lacrimal gland (Dacryoadenitis)	6
IV	**Conjunctiva:** Applied Anatomy, Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral, Allergic conjunctivitis, Granulomatous conjunctivitis) Degenerative conditions (Pinguecula, Pterygium, Concretions) Symptomatic conditions (Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration), Cysts and Tumors	8
V	**Cornea:** Applied Anatomy and Physiology, Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea), Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and non ulcerative. Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic) Degenerations (classifications, Arcussenilis, Vogt"s white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann"s nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration) Dystrophies (Reis Buckler	10

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	dystrophy,Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch"s epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy) Keratoconus, Keratoglobus, Corneal oedema, Corneal opacity, Corneal vascularisation, Penetrating Keratoplasty	
VI	**Uveal Tract and Sclera:** Applied Anatomy, Classification of uveitis, Etiology, Pathology, Anterior Uveitis, Posterior Uveitis, Purulent Uveitis, Endophthalmitis, Panophthalmitis, Pars Planitis, Tumors of uveal tract (Melanoma), Episcleritis and scleritis, Clinical examination of Uveitis and Scleritis	**8**
	Total	**45**

Suggested Readings:

1.Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

Indian Medicine and Telemedicine

Theory	Subject Code: BOP306
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Course Description: This course insight into existing healthcare system in India.

Learning Objective: At the end of the course student will be aware of the traditional and the latest healthcare system. The student also will get basic knowledge about the telemedicine practices in India especially in eye care.

Course Plan:

Unit	Topic	Hours
I	Introduction to healthcare delivery system, Healthcare delivery system in India at primary, secondary and tertiary care, Community participation in healthcare delivery system, Health system in developed countries, Private Sector, National Health Mission, National Health Policy, Issues in Health Care Delivery System in India	**8**
II	National Health Programmeme-Background objectives, action plan, targets, operations, achievements and constraints in various National	**8**

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	Heath Programmeme.	
III	Introduction to AYUSH system of medicine 1. Introduction to Ayurveda. 2. Yoga and Naturopathy 3. Unani 4. Siddha 5. Homeopathy Need for integration of various system of medicine	**8**
IV	Health scenario of India- past, present and future Telemedicine: Structure, components, Dissemination and Impact	**6**
	Total	**30**

Suggested Readings:

1. Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services. Joney & Bartlett learning, 2014 (page 167 -178)

Clinical Optometry-III

Practical	Subject Code: BOP307
Total Marks for Evaluation-100	No. of Contact Hours-120, Credits:4

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills. The practical aspects of the optometric optics (hand-on in optical), optometric instruments, clinical examination of visual system (Hands on under supervision) and ocular diseases (Slides and case discussion) will be given to the students during their clinical training.

Course Plan

1. Evaluation of EOM, Cover test, Hirschberg Test
2. Measurement of NPA, NPC, Stereopsis
3. Pupillary evaluation
4. Tests for Colour vision
5. Procedure of Confrontation
6. Measurement of IPD
7. Lensometry

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8. Keratometry
9. Placido disc
10. Ptosis evaluation
11. Proptosis evaluation
12. Anterior segment evaluation – Torch light and slit lamp evaluation
13. Photostress recovery test
14. Red saturation test

***Clinical laboratory rotation/observation can be incorporated wherever possible**

IVth SEMESTER

Optometric Instruments

Theory	Subject Code: BOP401
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course covers commonly used optometric instruments, its basic principle, description and usage in clinical practice.

Learning Objective: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the instruments that are utilised for a comprehensive ocular examination

Course Plan:

Unit	Topic	Hours
I	Optotypes and MTF, Spatial Frequency, Test charts standards. Choice of test charts, Trial case lenses, Refractor (phoropter) head units, Optical considerations of refractor units	7
II	Trial frame design, Near vision difficulties with units and trial frame, Retinoscope – types available, Adjustment of Retinoscopes- special features, Objective optometers, Infrared optometer devices	7
III	Projection charts, Illumination of the consulting room, Brightness acuity test, Vision analyzer, Pupilometer, Potential Acuity Meter, Abberometer	7

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IV	Ophthalmoscopes and related devices, Design of ophthalmoscopes – illumination, Design of ophthalmoscopes- viewing, Ophthalmoscope disc, Filters for ophthalmoscopy, Indirect ophthalmoscope	**6**
V	Lensometer, Lens gauges or clock, Slit lamp, Tonometers	**6**
VI	Keratometer and corneal topography, Refractometer, Orthoptic Instruments (Synaptophore Only), Color Vision Testing Devices	**6**
VII	Fields of Vision And Screening Devices, Scans, Electrodiagnostics, New Instruments	**6**
	Total	**45**

Optometric Instruments Practical

Practical	Subject Code: BOP401
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

PRACTICALS

1. Visual Acuity chart/drum
2. Retinoscope
3. Trail Box
4. Jackson Cross cylinder
5. Direct ophthalmoscope
6. Slit lamp Biomicroscope
7. Slit lamp Ophthalmoscopy (+90, 78 D)
8. Gonioscope
9. Tonometer: Applanation Tonometer
10. Keratometer
11. Perimeter
12. Electrodiagnostic instrument (ERG, VEP, EOG)
13. A –Scan Ultrasound
14. Lensometer

***Clinical Laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo- Optical Instrumentation, 2002.

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2. G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997.

Clinical Examination of Visual System

Theory	Subject Code: BOP402
Total Marks for Evaluation-80	No. of Contact Hours-15, Credits:1

Course Description: This course covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuroophthalmic examination, paediatric optometry examination, and Glaucoma evaluation.

Learning Objective: At the end of the course the students will be skilled in knowing the purpose, set-up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures.

Course Plan:

Unit	Topic	Hours
I	History taking, Visual acuity estimation, Extraocular motility, Cover teat, Alternating cover test, Hirschberg test, Modified Krimsky, Maddox Rod, Saccades and pursuit test	5
II	Pupils Examination, Color Vision, Stereopsis, Confrontation test, Photostress test, Amsler test, Contrast sensitivity function test	5
III	External examination of the eye, Slit lamp biomicroscopy, Van Herrick, Tonometry, ROPLAS, Schirmer"s, TBUT, tear meniscus level, NITBUT (keratometer), Ophthalmoscopy	5
	Total	**15**

Clinical Examination of Visual System Practical

Practical	Subject Code: BOP401
Total Marks for Evaluation-20	No. of Contact Hours-60, Credits:2

Practicals

1. History taking
2. Visual acuity estimation

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3. Extraocular motility, Cover teat, Alternating cover test
4. Hirschberg test, Modified Krimsky
5. Pupils Examination
6. Maddox Rod
7. Van Herrick
8. External examination of the eye, Lid Eversion
9. Schirmer"s, TBUT, tear meniscus level, NITBUT (keratometer),
10. Color Vision
11. Stereopsis
12. Confrontation test
13. Photostress test
14. Slit lamp biomicroscopy
15. Ophthalmoscopy
16. Tonometry
17. ROPLAS
18. Amsler test
19. Contrast sensitivity function test
20. Saccades and pursuit test

***Clinical Laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. T Grosvenor: Primary Care Optometry, 5th edition, Butterworth Heinneman, USA, 2007.

Visual Perception and Psychophysics

Theory	Subject Code: BOP402
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: The course covers the entire pathway of visual perception from image formation to brain resolving of images. The course covers various domains of visual perception including Spatial, Temporal, Depth, Motion and colour vision

Learning Objective: The course aims to provide the leaners with a clear understanding of the processes involved in the perception of various domain of vision. Specifically, the leaners will study about the various processes in the visual system to analyze the image that is formed on the retina.

Course Plan:

Unit	Topic	Hours

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I	Visual Physiology: Processing of light at each layer of retina, Types of Bipolar cells, ganglion cells, Receptive fields, Post retinal visual pathways in terms of visual processing, Duplex retina – Scotopic and photopic visual system, absolute sensitivity of vision, parallel pathways - parvo and magnoretinogeniculate pathway, postnatal human vision development	**7**
II	Introduction to Psychophysics: Weber"s Law and Fechner"s Law, Classical concepts of thresholds, Modern concepts of thresholds – statistical nature of thresholds; internal and external noise; factors affecting thresholds, Psychophysical methods of threshold estimations – methods of limits, staircase and adaptive techniques of threshold estimation, forced-choice procedures	**8**
III	Spatial & temporal aspects of vision: Basic concepts of photometry and radiometry, v Lambda function/ Luminance/ Illuminance, Modulation transfer function (MTF), contrast sensitivity function (CSF), Effect of optical and neural disorders on the CSF, Spatial summation, Ricco"s law, differences between acuity types, conversion of visual acuity to grating acuity, Nyquist limit, Temporal procession of vision, Critical flicker frequency (CFF), temporal summation, Bloch"s law, Motion perception, Depth perception – monocular and binocular depth cues	**8**
IV	Color vision: Rod and Cone Spectral Sensitivity Function, Theories of colour vision – trichromatic theory and colour opponent theory, visual processing involved in color perception, clinical testing of color vision and principles	**7**
	Total	**30**

Visual Perception and Psychophysics Practical

Practical	Subject Code: BOP402
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Determination of blur threshold
2. Visual acuity testing
3. Colour vision examination

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***Clinical Laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1.S. H. Schwartz, Visual Perception – A Clinical Orientation, 5/e, McGraw-Hill Medical Publishing Division, New York, USA, 20174. Strasinger, S. K., & Di Lorenzo, M. S. (2014). *Urinalysis and body fluids*. FA Davis.

Visual Optics-II

Theory	Subject Code: BOP403
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course deals with the concept of eye as an optical instrument and thereby covers different optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

Learning Objective: Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

Course Plan:

Unit	Topic	Hours
I	Accommodation & Presbyopia, Far and near point of accommodation, Range and amplitude of accommodation, Mechanism of accommodation, Variation of accommodation with age, Anomalies of accommodation, Presbyopia, Hypermetropia and accommodation	9
II	Convergence: Type, Measurement and Anomalies, Relationship between accommodation and convergence-AC/A ratio	9
III	Objective Refraction (Static & Dynamic), Streak retinoscopy, Principle, Procedure, Difficulties and interpretation of findings, Transposition and spherical equivalent, Dynamic retinoscopy various methods, Radical retinoscopy and near retinoscopy, Cycloplegic refraction	9
IV	Subjective Refraction: Principle and fogging, Fixed astigmatic dial (Clock dial), Combination of fixed and rotator dial (Fan and block	9

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	test), J.C.C, Duochrome test, Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging, Binocular refraction -Various techniques, prescribing guidelines, Understanding Myopia: Theories, definitions, myopia management, recent advancements	
V	Effective Power & Magnification: Ocular refraction vs. Spectacle refraction Spectacle magnification vs. Relative spectacle magnification, Axial vs. Refractive Ametropia, Knapp"s law, Ocular accommodation vs. Spectacle accommodation, Retinal image blur-Depth of focus and depth of field	**9**
	Total	**45**

Visual Optics-II Practical

Practical	Subject Code: BOP403
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

PRACTICALS:

1. Visual acuity, stereo acuity in emmetropia.
2. Myopia and pseudomyopia, myopia and visual acuity
3. Myopic correction - subjective verification - monocular and binocular
4. Hypermetropia - determination of manifest error subjectively
5. Hypermetropic correction: subjective verification
6. Demonstration of astigmatism
7. Use of slit and Keratometry to find the principle meridians
8. Astigmatism: Fan - subjective verification tests
9. Astigmatism: Cross-Cyl. - subjective verification tests
10. Measurement of accommodation: near and far points and range
11. Presbyopic correction and methods: accommodative reserve, balancing the relative accommodation and cross grid test
12. Methods of differentiating axial and refractive ametropia
13. Practice of Retinoscopy
14. Interpretation of cycloplegic retinoscopic findings.
15. Prescription writing
16. Binocular refraction
17. Photo refraction

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

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1.Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth Heinemann, 2007.
2.Duke –Elder"s practice of Refraction.
3.AI Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006.
4.George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002.
5. Leonard Werner, Leonard J. Press: Clinical Pearls in Refractive Care, Butterworth Heinemann, 2002.
6.David B. Elliot: Clinical Procedures in Primary Eye care, 3rd edition, Butterworth Heinemann, 2007.
7.WJ Benjamin: Borish"s clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA, 2006.

Ocular Disease-II

Theory	Subject Code: BOP405
Total Marks for Evaluation-100	No. of Contact Hours-45, Credits:3

Course Description: This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

Learning Objective: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on Etiology, Epidemiology, Symptoms, Signs, Course sequelae of ocular disease

1. Diagnostic approach, and
2. Management of the ocular diseases.

Course Plan:

Unit	Topic	Hours
I	**Retina and Vitreous:** Applied Anatomy, Congenital and Developmental disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) Retinal Vasculitis (Eales"s), Retinal Artery Occlusion (Central retinal Artery occlusion), Retinal Vein occlusion (Ischaemic, Non Ischaemic, Branch retinal vein occlusion), Retinal degenerations : Retinitis Pigmentosa, Lattice degeneration, Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age	9

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	related macular degeneration, Retinal Detachment: Rhegmatogenous, Tractional, Exudative), Retinablastoma, Diabetic retinopathy	
II	**Ocular Injuries:** Terminology: Closed globe injury (contusion, lamellar laceration), Open globe injury (rupture, laceration, penetrating injury, perforating injury), Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis), Non-Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational), Clinical approach towards ocular injury patients	**9**
III	**Lens:** Applied Anatomy and Physiology, Clinical examination, Classification of cataract Congenital and Developmental cataract, Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic) Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar. Management of cataract (non-surgical and surgical measures; preoperative evaluation, Types of surgeries,), Complications of cataract surgery, Displacement of lens: Subluxation, Displacement, Lens coloboma, Lenticonus, Microspherophakia.	**9**
IV	**Clinical Neuro-ophthalmology:** Anatomy of visual pathway, Lesions of the visual pathway, Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke"s hemianopic pupil, Marcus gunn pupil. Argyll Robetson pupil, Adie"s tonic pupil) Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy, Cortical blindness, Malingering Nystagmus, Clinical examination	**9**
V	**Glaucoma**: Applied anatomy and physiology of anterior segment, Clinical Examination Definitions and classification of glaucoma, Pathogenesis of glaucomatous ocular damage, Congenital glaucoma, Primary open angle glaucoma, Ocular hypertension, Normal Tension Glaucoma, Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure), Secondary Glaucoma Management: common medications, laser intervention and surgical techniques	**9**
	Total	**45**

Suggested Readings:

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A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

Behavioral Health Psychology

Theory	Subject Code: BOP406
Total Marks for Evaluation-100	No. of Contact Hours-15, Credits:1

Course Description: This course covers various aspects of Behavioral health psychology essential for the optometrist.

Learning Objective: At the end of the course, the student would have gathered knowledge various aspects of Behavioral health psychology essential for him to apply in the clinical scenario during his clinical postings.

Course Plan:

Unit	Topic	Hours
I	Evolution of Psychology, Personality theories, Developmental psychology; Introduction to Psychology, History of Psychology - Structuralism, Functionalism, Psychoanalytic of Sigmund Freud, Behaviourism, Gestalt psychology, Humanistic Psychology, Cognitive Psychology, Feministic Psychology, Multicultural Psychology, Personality Theories: Biomedical Model, Psycholanalytic theory- Personality structure, stages, Defense mechanisms, Behavioural Psychology- Classical Conditioning, Operant Conditioning, Vicarious/Observational learning behaviour), Positive Psychology (Martin Seligman), Humanistic Psychology (Carl Roger), Maslow"s Hierchy of Needs ,Eclectic approach, Nature Versus Nurture of Personality Developmental Psychology: Psychosexual stages of development, Psychosocial stages of development, Cognitive theory of development, Theory of moral development, social Cultural development- Sigmund Freud, Erickson, Piaget, Kohlberg, Lev Vygotsky, Bronfenbrenner"s.	5
II	Introduction to Health Psychology - What is Health Psychology, Father of health Psychology, what constitutes wellbeing? Models of Health Psychology - Biomedical Model and Biopsychosocial model Health Behaviour models - Health Belief Model, Transtheoretical Model, social Cognitive Theory, Theory of Planned behaviour.	5

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	Health Promotion - Precede Proceed model Illness belief. Beliefs that influence practitioners.	
III	Partnerships in health: Client-professional partnership. Issues in Client engagement with treatment, involving clients in care, chronic illness, disability, complex health issues, attitude and background of clients. Personality disorders. Depression Disorders. Anxiety disorders. Pain and types. Loss and models of Loss. Stress and Coping strategies. Compassionomics in healthcare.	**5**
	Total	**15**

Suggested Readings:

Patricia Barkway. Psychology for health professionals, 2nd edition, Elsevier, 2013

Introduction to Quality and Patient Safety

Theory	Subject Code: BOP407
Total Marks for Evaluation-100	No. of Contact Hours-15, Credits:1

Course Description: This course deals with various aspects of quality and safety issues in health care services.

Learning Objective: At the end of the course, students have gained introductory knowledge about quality and patient safety aspects from Indian perspectives.

Couse Plan:

Unit	**Topic**	**Hours**
I	Quality assurance and management	**3**
II	Basics of emergency care and life support skills	**3**
III	Biomedical waste management and environment safety	**3**
IV	Infection and prevention control	**2**
V	Antibiotic resistance	**2**
VI	Disaster preparedness and management	**2**
	TOTAL	**15**

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Suggested Readings: Faculty can decide

Clinical Optometry-IV

Practical	Subject Code: BOP408
Total Marks for Evaluation-100	No. of Contact Hours-120, Credits:4

Students will improve their skills in clinical procedures, and then progressive interactions with patients and professional personnel are monitored as students practice optometry in a supervised setting. Additional areas include problem solving and complications of various managements will be inculcated. Students should have exposure to eye bank facilities and must be made aware of eye donation, collection of eyes, preservation, pre and post operative instructions and latest techniques for preservation of donor cornea. The students will get clinical training on the practical aspects of the following courses namely optometric optic –II, visual optics – II and ocular disease -II.

Course Plan

1. History taking- Ocular and Special clinical conditions
2. Refraction
    a. Subjective
    b. Objective
3. Keratometry in special conditions like Keratoconus, High Astigmatism, Pterygium, Post ocular surgery
4. Lensometry - Bifocals and PAL"s
5. Pupillometry
6. Tonometry
    a. Applanation
    b. Other Tonometers
7. AC Grading - Van Herick method
8. Gonioscopy

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Vth SEMESTER

Systemic Diseases

Theory	Subject Code: BOP501
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Course Description: This course deals with definition, classification, clinical diagnosis, complications and management of various systemic diseases. In indicated cases ocular manifestations also will be discussed.

Learning Objective: At the end of the course, students should get acquainted with the following:

1. Common Systemic conditions: Definition, diagnostic approach, complications and management options
2. Ocular findings of the systemic conditions
3. First Aid knowledge

Course Plan:

Unit	Topic	Hours
I	Hypertension, Diabetes Mellitus, Acquired Heart disease, Thyroid Disease: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases	10
II	Cancer, Tropical infections, Tuberculosis, Herpes virus, Hepatitis, Acquired Immunodeficiency Syndrome: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases	10
III	Anaemia, Nutritional and metabolic disorders, Myasthenia Gravis, Connective Tissue Disease: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases	10
	Total	30

Suggested Readings:

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1. C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002.

2. Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999.

Dispensing Optics

Theory	Subject Code: BOP502
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect. In addition, deals with role of optometrists in optical set-up.

Learning Objective: Skills/knowledge to be acquired at the end of this course:

1. To select the tool power for grinding process
2. Different types of materials used to make lenses and its characteristics
3. Lens designs–Bifocals, progressive lens
4. Tinted, Protective & Special lenses
5. Spectacle frames –manufacture process & materials
6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counselling the patient.
8. Lens edge thickness calculation
9. Frame & lens measurements and selection
10. Writing spectacle lens order
11. Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
12. Lens verification and axis marking and fitting of all lens types
13. Final checking of finished spectacle with frame adjustments
14. Delivery and follow-up
15. Troubleshooting complaints and handling patient's questions

Course Plan:

Unit	Topic	Hours
I	Lens designs - compatible to contemporary eye frames. Components of spectacle prescription & interpretation, transposition, Add and near power relation	6

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II	Frame selection –based on spectacle prescription, professional requirements, age group, face shape. Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height. Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt, Dispensing for Myopia management spectacles	**6**
III	Neutralization –Hand & lensometer, axis marking, prism marking. Faults in spectacles (lens fitting, frame fitting, patients' complaints, description, detection and correction).	**6**
IV	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements). Final checking & dispensing of spectacles to customers, counselling on wearing & maintaining of spectacles	**6**
V	Spectacle repairs –tools, methods, soldering, riveting, Frame adjustments Special types of spectacle frames: Monocles, Ptosis crutches, Industrial safety glasses, Welding glasses, Frame availability in Indian market	**6**
	Total	**30**

Dispensing Optics Practical

Practical	Subject Code: BOP502
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Inter pupillary distance measurements using PD ruler and Pupillometry
2. Face and frame measurements and frame selection for dispensing spectacles.
3. Criteria of Selection for patients, spectacle frames for dispensing special ophthalmic lenses – prisms, bifocal, progressive, aspheric, lenticular, high index lenses, etc.
4. Bifocals - Measurements, Fitting, Verification and troubleshooting
5. Progressive Lenses – Special measurements, fitting, verification and troubleshooting.
6. Types of Progressive lenses available in India – Brand names, raw material properties, manufacturers suppliers' details, ordering systems, etc.
7. Myopia management spectacles dispensing- DIMS, HALT etc
8. Glazing, cutting and fitting Ophthalmic Lenses in all types of spectacle frames.

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9. *Frame manipulations and repairs*
10. Troubleshooting and problem solving of patients after Spectacle dispensing

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008.
2. Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth Heinemann, 1996.
3. C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rd edition, Butterworth - Heinemann, 2007.
4. Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth Heinemann, 2002.
5. A handbook on practical approach to troubleshooting and solution in spectacle dispensing - Lavanya Kalikivayi, Venkataramana Kalikivayi

Geriatric Optometry

Theory	Subject Code: BOP503
Total Marks for Evaluation-100	No. of Contact Hours-45, Credits:3

Course Description: This course deals with general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, pharmacological aspects of ageing, and spectacle dispensing aspects in ageing patients.

Learning Objective: The student on taking this course should
1. Be able to identify, investigate the age-related changes in the eyes.
2. Be able to counsel the elderly
3. Be able to dispense spectacles with proper instructions.
4. Adequately gained knowledge on common ocular diseases.

Course Plan:

Unit	Topic	Hours
I	Aspects of ageing: Introduction to geriatrics and gerontology, epidemiology of geriatrics in India, GNFC-AOA statistics and Functional Perspective on Ageing, physiological and pathological changes in ageing	10
II	Effects of ageing on Cardiovascular system, respiratory system, gastro intestinal, excretory and central nervous system.	12

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III	Preventive geriatrics – Periodical health assessment, lifestyle and dietary pattern. Healthy ageing- physical, mental and social health, social aspects of Ageing and Psychological aspects of Ageing, Pharmacological aspects of aging	**10**
IV	Optometric examination and management of the elderly: Ageing changes in the eye, Optometric Examination of the Elderly patient, Fitting and Dispensing spectacle for the elderly patient, Age related Eye Diseases, Ocular Implication of systemic diseases in the elderly, Management of geriatric patients	**13**
	Total	**45**

Suggested Readings:

1.OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005.
2. VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998.
3. DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002.

Pediatric Optometry

Theory	Subject Code: BOP504
Total Marks for Evaluation-80	No. of Contact Hours-45, Credits:3

Course Description: This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye conditions related to paediatric population. Also, it will inculcate the skill of transferring / communicating the medical information to the attender / patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

Learning Objective: At the end of the course the student is expected to:

1. Have a knowledge of the principle theories of childhood development, and visual development
2. Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
3. Be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders

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4. Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
5. Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
6. Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
7. Have a capacity for highly evolved communication and co-management with other professionals involved in paediatric assessment and care

Course Plan:

Unit	Topic	Hours
I	Development of the eye and the paediatric milestones: Ocular Embryology, Developmental Milestones	5
II	Normal appearance, pathology and structural anomalies: Orbit, Eye lids, Lacrimal system, Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil, Lens, vitreous, Fundus Oculomotor system	10
III	Paediatric eye disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics, Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism	10
IV	Paediatric eye examination: Overview – Paediatric eye examination, History taking Paediatric subjects, Visual Acuity Assessment in different age groups, Refractive Examination	10
V	Determining binocular status, Determining sensory motor adaptability, Compensatory treatment and remedial therapy for: Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia, Remedial and Compensatory treatment of Strabismus and Nystagmus Spectacle dispensing for children, Paediatric contact lenses, Low vision assessment in children	10
	Total	45

Pediatric Optometry

Practical	Subject Code: BOP504

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Total Marks for Evaluation-80	No. of Contact Hours-15, Credits:0.5

Practicals

1. Demonstrate vision assessment using different vision testing charts/techniques for different paediatric age groups.
2. Handling and performing comprehensive eye examination for a pediatric patient.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982.
2. Paediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth Heinemann, 2004.
3. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden"s, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
4. Assessing Children"s Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
5. Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993.

Diagnostics and Therapeutics of Anterior Segment Diseases

Theory	Subject Code: BOP505
Total Marks for Evaluation-80	No. of Contact Hours-60, Credits:4

Course Description: This course consists of the pathophysiology, pharmacotherapy, and clinical management of systemic and ocular disease through a combination of lectures and team-based learning approaches. The basic principles of pharmacology will be followed by overviews of drugs used to treat diseases of each system. The role of the optometrist in the health care system will be emphasized.

Learning Objective:

1. To Diagnose and sequential anterior segment ocular disease management.
2. To list down management options in terms of optometric, pharmacological, LASER and surgical categories.
3. To determine sequential management protocol and other referral needs.

Course Plan:

Unit	Topic	Hours
I	Pathophysiology and clinical management of systemic and anterior segment ocular disease	10

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II	Overview of drugs used in treatment of anterior segment disease	10
III	LASER for anterior segment disease management, overview of surgical intervention for anterior segment disease	10
IV	Vertical Integration of all treatment options of anterior segment disease with special emphasis on optometric management	10
V	Interpretation and diagnose conditions using – Biometry (Contact and Non-Contact), Corneal Topography, Pentacam, Anterior Segment Optical Coherence Tomography, Specular Microscopy, Meibography.	10
VI	Interpretation and diagnose conditions using – Perimetry, Posterior segment Optical Coherence Tomography, Ultrasound Biomicroscopy, Heidelberg Retinal Tomography (Cornea and Optic Nerve)	10
	Total	**60**

Diagnostics and Therapeutics of Anterior Segment Diseases Practical

Practical	Subject Code: BOP505
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Perform and Interpret Biometry (Contact and Non-Contact), Corneal Topography, Pentacam, Anterior Segment Optical Coherence Tomography, Specular Microscopy, Meibography
2. Perform and Interpret Perimetry, Posterior segment Optical Coherence Tomography, Ultrasound Biomicroscopy, Heidelberg Retinal Tomography (Cornea and Optic Nerve)

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

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Innovation and Technology

Theory	Subject Code: BOP506
Total Marks for Evaluation-80	No. of Contact Hours-15, Credits:1

Course Description: The course will cover advancements and innovations in medical and optometric instruments, ocular diagnostics, service delivery and management of ocular diseases. Students will get an opportunity to learn, develop and validate new instruments, softwares for vision and eye testing and data managing systems.

Learning Objective:

1. To cover comprehensively the process of converting an idea into a product.
2. To understand the design, working principle and optics of ophthalmic instruments.
3. To design and develop hardware and software for vision and eye testing.
4. To understand the basics of health and optometry informatics.
5. To develop software for management of eye health data.

Course Plan:

Unit	Topic	Hours
I	Research & Ideation: Concepts. Understanding design and optics behind ophthalmic instruments	5
II	Prototype development	5
III	Clinical validation	5
	Total	**15**

Innovation and Technology Practical

Practical	Subject Code: BOP506
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Develop a prototype of a simple clinical instrument and validate for clinical use.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings: Faculty can decide

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Clinical Optometry-V

Theory	Subject Code: BOP507
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

The course provides students the opportunity to continue to develop confidence and increased skill in diagnosis and treatment delivery. Students will demonstrate competence in basic, intermediate and advanced procedures in those areas. Students will participate in advanced and specialized diagnostic and management procedures. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be provided in various outreach programmemes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

Course Plan:

Unit	Topic	Hours
I	Evidence Based Practice on the following common Clinical Conditions: Myopia/ Hyperopia, Astigmatism, Presbyopia, Headache	15
II	Evidence Based Practice on the following Common Clinical Conditions: Cataract, Open Angle Glaucoma, Angle closure glaucoma	15
	Total	30

Clinical Optometry-V Practical

Practical	Subject Code: BOP507
Total Marks for Evaluation-20	No. of Contact Hours-120, Credits:4

Practicals:

1. Lens fitting

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2. Frame measurements
3. Ocular Measurements - Axial, ACD, LT
4. Slit Lamp evaluation of anterior segment
5. Retina Evaluation a. 78D and 90 D b. Direct Ophthalmoscopy c. Indirect Ophthalmoscopy
6. Topography, Pentacam, Pachymetry,Specular Microscopy and Aberrometry Interpretation
7. Meibography Interpretation
8. OCT Interpretation
9. Visual Field Interpretation

***Clinical laboratory rotation/observation can be incorporated wherever possible**

VIth SEMESTER

Contact Lenses-I

Theory	Subject Code: BOP601
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

Learning Objective: Upon completion of the course, the student should be able to:

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. Finalise the CL design for various kinds patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

Course Plan:

Unit	Topic	Hours
I	Introduction to Contact lenses: Definition, Classification / Types. History of Contact Lenses. Optics of Contact Lenses: Magnification & Visual field, Accommodation & Convergence, Back & Front Vertex Power / Vertex distance calculation. Review of Anatomy & Physiology of Tear film, Cornea, Lids & Conjunctiva	6
II	Introduction to CL materials: Monomers, Polymers, Properties of CL materials: Physiological (Dk, Ionicity, Water content), Physical	6

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	(Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index), Indications and contraindications, Parameters / Designs of Contact Lenses & Terminology	
III	RGP Contact Lens materials, Manufacturing Rigid and Soft Contact Lenses – various methods, Pre-Fitting examination – steps, significance, recording of results, Correction of Astigmatism with RGP lens. Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses. Calculation and finalising Contact lens parameters.	**6**
IV	Ordering Rigid Contact Lenses – writing a prescription to the Laboratory. Checking and verifying Contact lenses from Laboratory. Modifications possible with Rigid lenses. Common Handling Instructions: Insertion & Removal Techniques, Do's and Don'ts	**6**
V	Care and Maintenance of Rigid lenses: Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners. Follow up visit examination. Complications of RGP lenses	**6**
	Total	**30**

Contact Lenses-I Practical

Practical	Subject Code: BOP601
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Measurement of Ocular dimensions
2. Pupillary diameter and lid characteristics
3. Blink rate and TBUT
4. Schirmer's test, Slit lamp examination of tear layer
5. Keratometry
6. Placido's disc
7. Soft Contact Lens fitting – Aspherical
8. Soft Contact Lens fitting – Lathe cut lenses
9. Soft Contact Lens over refraction
10. Lens insertion and removal

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11. Lens handling and cleaning
12. Examination of old soft Lens
13. RGP Lens fitting
14. RGP Lens Fit Assessment and fluorescein pattern
15. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
16. RGP over refraction and Lens flexure
17. Examination of old RGP Lens
18. RGP Lens parameters
19. Slit lamp examination of Contact Lens wearers

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. IACLE modules A-F
2. CLAO Volumes 1,2,3
3. IACLE case discussion series also for resources for teaching
4. Anthony J. Phillips: Contact Lenses, 5thedition, Butterworth-Heinemann, 2006.
5. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004.
6. E S. Bennett,V A Henry: Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008.

Low Vision Care and Rehabilitation

Theory	Subject Code: BOP602
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: This course deal with the definition of low vision, epidemiology aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive devices for totally visually challenged, art of prescribing low vision devices and training the low vision patients and other rehabilitation measures.

Learning Objective: At the end of the course, the student will be knowledgeable in the following:

1. Definition and epidemiology of Low Vision
2. Clinical examination of Low vision subjects
3. Optical, Non-Optical, Electronic, and Assistive devices.
4. Training for Low Vision subjects with Low vision devices
5. Referrals and follow-up

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Unit	Topic	Hours
I	Definitions & classification of Low vision, Epidemiology of low vision, Model of low vision service	7
II	Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision, Types of low vision aids – optical aids, non-optical aids & electronic devices, Optics of low vision aids	7
III	Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training, Pediatric Low Vision care, Low vision aids – dispensing & prescribing aspects	8
IV	Visual rehabilitation & counselling, Legal aspects of Low vision in India, Case Analysis	8
	Total	**30**

Low Vision Care and Rehabilitation Practical

Practical	Subject Code: BOP602
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Attending in low vision care clinic and history taking.
2. Determining the type of telescope and its magnification (Direct comparison method & calculated method).
3. Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
4. Inducing visual impairment and prescribing magnification.
5. Determining reading speed with different types of low vision aids with same magnification.
6. Determining reading speed with a low vision aid of different magnifications
7. Demonstrate staining for carbohydrates, lipids, amyloid collagen, reticulin, elastic fibres, pigments, and Acid-Fast Bacillus (AFB).
8. Demonstrate immunohistochemistry techniques, Enzyme histochemistry-diagnostic applications and the demonstration of phosphates, dehydrogenases, oxidases and peroxidases.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

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1. Functional Assessment of Low Vision by Bruce P.Rosenthal.
2. Remediation and Management of Low Vision Mosby's optometric problem solving series; Editors, Roy Gordon Cole, Bruce P. Rosenthal
1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998.
1. Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.
2. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999.
3. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991.
4. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

Binocular Vision-I

Theory	Subject Code: BOP603
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: This course provides theoretical aspects of Binocular Vision and its clinical application. It deals with basis of normal binocular vision and space perception, Gross anatomy and physiology of extraocular muscles, various binocular vision anomalies, its diagnostic approaches and management.

Learning Objective: On successful completion of this module, a student will be expected to be able to:

1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
2. Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

Course Plan:

Unit	Topic	Hours
I	Binocular Vision and Space perception: Relative subjective visual direction, Retino motor value, Grades of BSV, SMP and Cyclopean Eye, Correspondence, Fusion, Diplopia, Retinal rivalry, Horopter, Physiological Diplopia and Suppression, Stereopsis, Panam's area, BSV, Stereopsis and monocular clues – significance, Egocentric location, clinical applications, Theories of Binocular vision.	6
II	Anatomy of Extra Ocular Muscles: Rectii and Obliques, LPS, Innervation & Blood Supply. Physiology of Ocular movements:	6

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	Center of rotation, Axes of Fick, Action of individual muscle. Laws of ocular motility: Dondre's and Listing's law, Sherrington's law, Hering's law. Uniocular & Binocular movements - fixation, saccadic & pursuits: Version &Vergence, Fixation & field of fixation	
III	Near Vision Complex Accommodation: Definition and mechanism (process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation – aetiology and management. Convergence: Definition and mechanism, Methods of measurement, Types and components of convergence - Tonic, accommodative, fusional, proximal. Anomalies of Convergence – aetiology and management.	**6**
IV	Sensory adaptations: Confusion, Suppression, Investigations, Management. Abnormal Retinal Correspondence: Investigation and management, Blind spot syndrome. Eccentric Fixation: Investigation and management.	**6**
V	Amblyopia: Classification, Aetiology, Investigation, Management	**6**
	Total	**30**

Binocular Vision-I Practical

Practical	Subject Code: BOP603
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Deals with hand-on session the basic binocular vision evaluation techniques

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd.
3. Gunter K. V. Mosby Company
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

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Diagnostics and Therapeutics of Posterior Segment Diseases

Theory	Subject Code: BOP604
Total Marks for Evaluation-100	No. of Contact Hours-60, Credits:4

Course Description: This course consists of the pathophysiology, pharmacotherapy, and clinical management of systemic and ocular disease through a combination of lectures and team-based learning approaches. The basic principles of pharmacology will be followed by overviews of drugs used to treat diseases of each system. The role of the optometrist in the health care system will be emphasized.

Learning Objective:

1. To Diagnose and sequential posterior segment ocular disease management.
2. To list down management options in terms of optometric, pharmacological, LASER and surgical categories.
3. To determine sequential management protocol and other referral needs.
4. To propose schematic management options available for all posterior segment disease.
5. To sequence management options in terms of optometric, pharmacology, LASER and surgery.
6. To identify stakeholders for referral.

Course Plan:

Unit	Topic	Hours
I	Pathophysiology and clinical management of systemic and posterior segment ocular disease	10
II	Overview of drug used in treatment of posterior segment disease	10
III	LASER for posterior segment disease management, overview of surgical intervention for posterior segment disease	10
IV	Vertical Integration of all treatment options of posterior segment disease with special emphasis on optometric management	10
V	Perform, interpret and diagnose anterior and posterior segment diseases images, Fundus Fluorescein Angiography, Electrodiagnostics and Visual Evoked Potential	10
VI	Perform, interpret and diagnose conditions using – Contrast acuity, Potential acuity meter, Retinometer, Brightness acuity test,	10

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	Photostress test, Amsler charting	
	Total	**60**

Diagnostics and Therapeutics of Posterior Segment Diseases Practical

Practical	Subject Code: BOP604
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals

1. Direct ophthalmoscopy examination
2. 90D examination of Optic disc
3. Fundus photography
4. Other procedure o Contrast acuity
5. Potential acuity meter
6. Retinometer, Brightness acuity test
7. Photostress test
8. Amsler charting

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

Optometry and Multidisciplinary Aspects of Health

Theory	Subject Code: BOP605
Total Marks for Evaluation-100	No. of Contact Hours- 15, Credits:1

Course Description: The course will cover integrating eye health systems into multispecialty care. This would help students understand about the holistic needs of the patients and gain knowledge on the health care delivery systems. Setting up independent optometry practices integrated with other healthcare disciplines would enable co management, improve the referral pattern, provide convenient and cost-effective care for patients.

Learning Objective:

1. To appreciate the connection between ocular and systemic diseases and rehabilitation.
2. To integrate systemic diseases and be aware of the health care delivery systems.
3. To understand the primary, secondary and tertiary eye care services.

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4. To understand the need for integrating eye care services into other health care delivery models.

Course Plan:

Unit	Topic	Hours
I	Health care models 1. International health care models 2. National health care models 3. Decentralized health care delivery systems 4. Pros and cons of different health care models 5. Universal health coverage	3
II	General and systemic rehabilitation services 1. Models of health care for different systemic illness 2. Rehabilitation models 3. Referral to rehabilitation setups	3
III	Primary, secondary and tertiary eye care models 1. Preventive, promotive and curative eyecare 1. Primary, secondary and tertiary eye care	3
IV	Integrating health care professions 1. Integration of primary health and primary eye care 2. Integration of eye care services to bigger model of health care 3. Problem oriented health care records 4. Co-management with other healthcare specialties 5. Development of comprehensive management plan 2. Benefits of multidisciplinary approach to eye care	3
	Total	15

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Research Methodology & Biostatistics

Theory	Subject Code: BOP606
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Learning Objective: The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

Course Plan:

Unit	Topic	Hours
I	Research Methodology: Introduction to research methods, Identifying research problem, Ethical issues in research, Research design, Types of Data, Research tools and Data collection methods, sampling methods, Developing a research proposal	10
II	Biostatistics: Introduction, Central Limit Theorem, Measures of Morality, Sampling, Statistical significance, Correlation, Sample size determination Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion	10
III	Statistical tests to compare means in normal and not normal distribution with one or more groups. Tests to check for association between groups. Use of computerized software for statistics	10
	Total	30

1. Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
2. Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
3. Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015.

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Clinical Optometry-VI

Thoery	Subject Code: BOP607
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

Course Plan:

Unit	Topic	Hours
I	Evidence Based Practice on the following Common Clinical Conditions: Blepharitis/ Chalazion /Stye, Pinguecula, Conjunctival Cyst, Concretions, Conjunctival Naevus, Pterygium Pseudophakia/ Aphakia	15
II	Evidence Based Practice on the following Common Clinical Conditions: Dry eye Esotropia/ Exotropia/ Other types of Squint, Acute Red eye/ Subconjunctival Hemorrhage/ Conjunctivitis	15
	Total	30

Clinical Optometry-VI Practical

Practical	Subject Code: BOP607
Total Marks for Evaluation-20	No. of Contact Hours-120, Credits:4

Practicals:

1. Comprehensive eye examination
2. Community out-reach (Screening camps, Awareness camps and impact assessments for children, adult and geriatric population and occupation specific camps).
3. Basic BV work up
4. Low Vision assessment.
5. Contact Lens Fitting - Soft lens
6. Contact Lens fitting - RGP lens
7. Interpretation of OCT - Posterior Segment

***Clinical laboratory rotation/observation can be incorporated wherever possible**

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VIIth SEMESTER

Contact Lenses-II

Theory	Subject Code: BOP701
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

Learning Outcomes: Upon completion of the course, the student should be able to:

1.Understand the basics of contact lenses
2.List the important properties of contact lenses
3.Finalize the CL design for various kinds patients
4.Recognize various types of fitting
5.Explain all the procedures to patient
6.Identify and manage the adverse effects of contact lens

Course Plan:

Unit	Topic	Hours
I	SCL Materials & Review of manufacturing techniques Comparison of RGP vs. SCL Pre-fitting considerations for SCL Fitting philosophies for SCL Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum, Calculation and finalising SCL parameters 1. Disposable lenses 2. Advantages and availability	5
II	Soft Toric CL 1. Stabilization techniques 2. Parameter selection 3. Fitting assessment	4
III	Common Handling Instructions 1. Insertion & Removal Techniques 2. Do's and Don'ts Complications of Soft lenses surgery	4

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IV	Care and Maintenance of Soft lenses 1. Cleaning agents & Importance 2. Rinsing agents & Importance 3. Disinfecting agents & importance 4. Lubricating & Enzymatic cleaners Follow up visit examination	**5**
V	Therapeutic contact lenses 1. Indications 2. Fitting consideration	
VI	Specialty fitting 1. Aphakia 2. Pediatric 3. Corneal ectasia 4. Post refractive surgery 5. Ocular surface disease 6. Occupational fitting	**5**
VII	Management of Presbyopia with Contact lenses	**2**
	Total	**30**

Contact Lenses-II Practical

Practical	Subject Code: BOP701
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

1. Examination of old soft Lens
2. RGP Lens fitting

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3. RGP Lens Fit Assessment and fluorescein pattern
4. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
5. RGP over refraction and Lens flexure
6. Examination of old RGP Lens
7. RGP Lens parameters
8. Fitting Cosmetic Contact Lens
9. Slit lamp examination of Contact Lens wearers
10. Fitting Toric Contact Lens
11. Bandage Contact Lens
12. SPM & Pachymetry
13. Specialty Contact Lens fitting.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. IACLE modules A-F.
2. CLAO Volumes 1, 2, 3.
3. IACLE case discussion series also for resources for teaching.
4. Anthony J. Phillips: Contact Lenses, 5thedition, Butterworth-Heinemann, 2006.
5. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004.
6. E S. Bennett, V A Henry: Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008.

Binocular Vision-II

Theory	Subject Code: BOP702
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: This course deals with understanding of strabismus, its classification, necessary orthoptic investigations, diagnosis and non-surgical management. Along with theoretical knowledge it teaches the clinical aspects and application.

Learning Outcomes: The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

Course Plan:

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Unit	Topic	Hours
I	Neuro-muscular anomalies 1. Classification and etiological factors History – recording and significance	1
II	**Convergent strabismus** 1. Accommodative convergent squint: Classification, Investigation and Management 2. Non accommodative Convergent squint: Classification, Investigation and Management **Divergent Strabismus:** Classification, A& V phenomenon, Investigation and Management **Vertical strabismus:** Classification, Investigation and Management **Paralytic Strabismus**: Acquired and Congenital, Clinical Characteristics **Distinction from comitant and restrictive Squint**	8
III	Investigations 1. History and symptoms 2. Head Posture 3. Diplopia Charting 4. Hess chart 5. PBCT 6. Nine directions 7. Binocular field of vision	8
IV	Treatment of Amblyopia Nystagmus	4
V	Non-surgical Management of Squint	2
VI	Restrictive Strabismus 1. Features	6

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	2. Musculo-fascical anomalies 3. Duane's Retraction syndrome 4. Clinical features and management 5. Brown's Superior oblique sheath syndrome 6. Strabismus fixus 7. Congenital muscle fibrosis	
VII	Surgical management of squint	**1**
	Total	**30**

Binocular Vision-II Practical

Practical	Subject Code: BOP702
Total Marks for Evaluation-20	No. of Contact Hours-30, Credits:1

Practicals

Deals with hand-on session the basic binocular vision evaluation techniques.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings:

1. Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd.
3. Gunter K. Von Noorden: BURIAN- VON NOORDEN"S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company.
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers.

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Public Health & Epidemiology

Theory	Subject Code: BOP703
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Course Description: Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems especially focused on Indian scenario.

Learning Objective: At the end of the course students will be be knowledgeable in the following areas:

1. Community based eye care in India.
2. Prevalence of various eye diseases
3. Developing Information Education Communication materials on eye and vision care for the benefit of the public
4. Organize health education programmemes in the community
5. Vision screening for various eye diseases in the community and for different age groups.

Course Plan:

Unit	Topic	Hours
I	Public Health Optometry: Concepts and implementation, Stages of diseases Dimensions, determinants and indicators of health	5
II	Levels of disease prevention and levels of health care patterns	5
III	Contrasting between Clinical and community health programmes, Community based rehabilitation programmes	5
IV	National and International health agencies, Organization and Management of Eye Care Programmes – Service Delivery models	5
V	Health manpower and planning & Health Economics, Evaluation and assessment of health programmemes, IEC Materials, KAP survey	5
VI	Principles of Epidemiology and Epidemiological Methods, Health Information and Basic Medical Statistics, Descriptive epidemiology: Person, place, time, Prevalence, Incidence and Magnitude of diseases, Screening in the detection of disease, Sampling & Sample size determination	5
	Total	**30**

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Suggested Readings:

1. GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programmeme for control of blindness, New Delhi, 2002.
2. Newcomb RD, Jolley JL: Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980.
3. K Park: Park"s Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007.
4. MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002

Law And Professional Ethics-Optometry

Theory	Subject Code: BOP704
Total Marks for Evaluation-100	No. of Contact Hours-15, Credits:1

Course Description: Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

Couse Plan:

Unit	Topic	Hours
I	Medical ethics - Definition - Goal - Scope • Introduction to Code of conduct • Basic principles of medical ethics –Confidentiality	2
II	Malpractice and negligence - Rational and irrational drug therapy, Autonomy and informed consent - Right of patients	3
III	Care of the terminally ill- Euthanasia, Organ transplantation	2
IV	Medico legal aspects of medical records –Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical	5

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	records - other various aspects.	
V	Professional Indemnity insurance policy, Development of standardized protocol to avoid near miss or sentinel events, Obtaining an informed consent.	3
	Total	**15**

Suggested Readings:

1. Medico-Legal and Ethical Issues in Eye Care: Case Senarios for Optometrists, Opticians, Ophthalmologists and Family Physicians by Kah Guan Au Eong , Catherine Tay.
2. Law and Ethics for the Eye Care Professional Barbara K Pierscionek London : Butterworth Heinemann Elsevier 2008.
3. Code of conduct and ethics document for optometrists on OCI website Reference: Law and Optometry: A guide for optometry professionals and optometry students in India, Vijaya kumar.

Community Eye Health

Practical	Subject Code: BOP705
Total Marks for Evaluation-100	No. of Contact Hours-45, Credits:1.5

Course Description: The course would help students apply theories taught in the public health and epidemiology course. The basic principles of public health, Ten Commandments of screening, screening of specific eye health ailments, data collection, data management and technical and non-technical reporting of the screenings conducted will be emphasized. Students will be posted in community outreach activities of the organization. Students will get hands-on experience in handling community eye health programmemes including school eye screening programmes, adult comprehensive eye examination, cataract screening etc.

Learning Objectives:

1. Learn the principles and commandments of Screening.
2. Learn Implementation and evaluation of a community outreach programme.
3. Participate in community outreach programmes.
4. To organize and conduct an Eye camp.

Course Plan:

To be involved in all community outreach activities of the institution.

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Course Plan:

Unit	Topic	Hours
I	Exclusive training of 1. School screenings. 2. Vision screening of different ages and occupations. 3. Diabetic retinopathy screening, 4. Glaucoma Screening, 5. Geriatric doorstep care, 6. Special children vision screening.	45
	Total	**45**

Suggested Readings:

1. Newcomb RD, Jolley JL: Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980.
2. K Park: Park"s Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007.

Clinical Optometry-VII

Theory	Subject Code: BOP706
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

Learning Objectives:

1. To acquire the basic knowledge and experience of conducting research systematically.
2. To demonstrate an understanding of the relevant roles and responsibilities involved.
3. To conduct basic review of literature.
4. To design a brief methodology

Clinical Optometry-VII Practical

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Practical	Subject Code: BOP706
Total Marks for Evaluation-20	No. of Contact Hours-120, Credits:4

Practicals:

1. Comprehensive eye examination.
2. Community out-reach (Screening camps, Awareness camps and impact assessments for children, adult and geriatric population and occupation specific camps).
3. Comprehensive BV work up and Vision Therapy.
4. Low Vision assessment and Management.
5. Special Children evaluation (Observation).
6. Interpretation of specialty Contact Lens Fitting - Video Demonstration.
7. Retinal Diagnostics Interpretation (OCT, HRA, FFA, ICG, OCTA, ERG, EOG, mfERG).

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings: Faculty can decide.

Research Project-I

Practical	Subject Code: BOP707
Total Marks for Evaluation-100	No. of Contact Hours-90, Credits:3

Team of students will be doing a research project under the guidance of a supervisor (who could be optometrists/vision scientists/ ophthalmologist). Students will get the experience of doing research in a systematic approach – identifying the primary question, literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection, data analysis, thesis writing and presentation.

VIIIth SEMESTER

Occupational Optometry

Theory	Subject Code: BOP801
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

Course Description: This course deals with general aspects of occupational health, Visual demand in various job, task analysing method, visual standards for various jobs, occupational hazards and remedial aspects through classroom sessions and field visit to the factories.

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Learning Ojectives: At the end of the course the students will be knowledgeable in the following aspects:

1. In visual requirements of jobs.
2. In effects of physical, chemical and other hazards on eye and vision.
3. To identify occupational causes of visual and eye problems.
4. To be able to prescribe suitable corrective lenses and eye protective wear based on occupation and sport.
5. To set visual requirements, standards for different jobs.

Course Plan:

Unit	Topic	Hours
I	Introduction to occupational health, National and international organisations/agencies of occupational health, Labour reforms, Occupational health centre in organised sector, Health care for workers in unorganised sector, Role of occupational health physician, Industrial hygienist, and Safety officer; Occupational diseases and occupational related diseases, Occupational Hazards.	10
II	Occupational optometry, role of optometrist in industry, Steps involved in occupational optometry services, Visual task analysis, Ocular injuries, Electromagnetic radiations, visual functions for different occupations, Vision standards, Personal protective equipment, Lighting and occupation, Contact lens for various occupations.	10
III	Case studies on visual health in various occupations.	10
	Total	30

Occupational Optometry Practical

Practical	Subject Code: BOP801
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals:

1. Perform visual task analysis.
2. Industrial Vision Screening – Modified clinical method and Industrial Vision test.

***Clinical laboratory rotation/observation can be incorporated wherever possible**

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Suggested Readings:

1. PP Santanam, R Krishnakumar, Monica R. Dr. Santanam"s text book of Occupational optometry. 1st edition, Published by Elite School of optometry, unit of Medical Research Foundation, Chennai, India, 2015.
2. R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001.

Practice Management

Theory	Subject Code: BOP802
Total Marks for Evaluation-100	No. of Contact Hours-30, Credits:2

Course Description: This course deal with all aspects of optometry practice management – business, accounting, taxation, professional values, and quality & safety aspects.

Learning Objectives: At the end of the course, student would have gained knowledge on various aspects of private optometric practice from Indian perspective.

Course Plan:

Unit	Topic	Hours
I	Business Management: Practice establishment and development, Stock control and costing, Staffing and staff relations, Business computerization	10
II	Accounting Principles: Sources of finance, Bookkeeping and cash flow. Taxation and taxation planning	10
III	Professionalism and Values: Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality. Personal values- ethical or moral values. Attitude and behaviour- professional behaviour, treating people equally. Code of conduct, professional accountability and responsibility, misconduct. Differences between professions and importance of team efforts, Cultural issues in the healthcare environment.	10
	Total	**30**

Suggested Readings:

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1. L. S. Thal, S. Quintero, Business aspects of Optometry, 3rd edition - Association of Practice Management Educators – Butterworth Heinemann Elsevier, USA, 2010

Community Eye Health and Tele-optometry

Theory	Subject Code: BOP803
Total Marks for Evaluation-80	No. of Contact Hours-15, Credits:1

Course Description: The course would help students apply theories taught in the public health and epidemiology course. The basic principles of public health, Ten Commandments of screening, screening of specific eye health ailments, data collection, data management and technical and non-technical reporting of the screenings conducted will be emphasized. Students will be posted in community outreach activities of the organization. Students will get hands-on experience in handling community eye health programmes including school eye screening programs, adult comprehensive eye examination, cataract screening etc.

Learning Objectives:

1. Learn the principles and commandments of Screening.
2. Develop relevant IEC materials and deliver them at the campsites.
3. Develop and conduct surveys to understand the practices and knowledge of stakeholders.
4. Learn the cost analysis pertaining to community outreach.
5. Learn Implementation and evaluation of a community outreach program.

Course Plan:

Unit	Topic	Hours
I	Epidemiology of blindness – Defining blindness and visual impairment. Prevalence, incidence and distribution of visual impairment. Eye in primary health care. Community Eye Care Programs	5
II	Nutritional Blindness with reference to Vitamin A deficiency. Screening for eye diseases – Refractive errors, Low Vision, Cataract, Diabetic retinopathy, Glaucoma, Amblyopia, Squint. National and International Agencies - NPCB, IAPB, WHO. Role of an optometrist in Public Health. Optometrists' role in school eye health programmes	5
III	Basics of Tele Optometry and its application in Public Health. Information, Education and Communication for Eye Care programs. Health Information and Basic Medical Statistics. Communication for Health Education. Health Planning and Management. Plan and implement 2030 INSIGHT	5

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	Total	**15**

Community Eye Health and Tele-optometry Practical

Practical	Subject Code: BOP803
Total Marks for Evaluation-20	No. of Contact Hours-60, Credits:2

Practicals:

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings: Faculty can decide

Suggested Readings:

1. Newcomb RD, Jolley JL: Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980.
2. K Park: Park"s Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007.

Data Science for Healthcare

Theory	Subject Code: BOP804
Total Marks for Evaluation-80	No. of Contact Hours-15, Credits:1

Course Description: This course offers a systematic introduction to the scope and contents of health data arising from public health and the biomedical sciences. It focuses on rules and techniques for handling health data. Through both regular lectures and guest lectures, this course covers a broad range of health data.

Learning Objectives:

1. To understand the foundation and rules for handling big health data.
2. To develop a practical knowledge and understanding of important statistical issues and relevant data analytics for health big data analysis.
3. To learn and master basic software and programming skills for data cleaning and data processing.

Course Plan:

Unit	Topic	Hours

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I	Foundations of data science: Probability and statistics, Linear algebra for data science, Optimisation for data science	5
II	Health care systems, types of data in healthcare, Healthcare data literacy, Health care data security, compliance and privacy	5
III	Machine learning: foundations and algorithms, Machine learning and real-world use: cases in biology and health care, disease modelling, Applications and benefits of data science.	5
	Total	**15**

Data Science for Healthcare Practical

Practical	Subject Code: BOP804
Total Marks for Evaluation-20	No. of Contact Hours-15, Credits:0.5

Practicals:

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings: Faculty can decide

Clinical Optometry-VIII

Theory	Subject Code: BOP805
Total Marks for Evaluation-80	No. of Contact Hours-30, Credits:2

The course is the final series of seven directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

Course Plan:

Unit	Topic	Hours
I	Evidence Based Practice on the following Common Clinical Conditions: Convergence insufficiency/ Divergence excess, Post	15

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	refractive surgery, Optic atrophy, Retinal Detachment	
II	Evidence Based Practice on the following Common Clinical Conditions: Retinitis pigmentosa, CSNB, Stargardt's Disease, Age related macular Degeneration, Diabetic retinopathy, Hypertensive Retinopathy	**15**
	Total	**30**

Suggested Readings: Faculty can decide.

Clinical Optometry-VIII Practical

Practical	Subject Code: BOP805
Total Marks for Evaluation-20	No. of Contact Hours-120, Credits:4

Practicals:

1. Comprehensive eye examination
2. Community out-reach (Screening camps, Awareness camps and impact assessments for children, adult and geriatric population and occupation specific camps).
3. Neuro-optometric work up.
4. Ocular surface work up.
5. Cornea work up.
6. Glaucoma work up.
7. Uvea work up

***Clinical laboratory rotation/observation can be incorporated wherever possible**

Suggested Readings: Faculty can decide.

Research Project-II

Practical	Subject Code: BOP806
Total Marks for Evaluation-100	No. of Contact Hours-120, Credits:4

Course Description: Team of students will be doing a research project under the guidance of a supervisor (who could be optometrists/vision scientists/ ophthalmologist). Students will get the experience of doing research in a systematic approach – identifying the primary question,

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literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection, data analysis, thesis writing and presentation.

Learning Objectives:

1. To acquire the basic knowledge and experience of collecting necessary data for the research topic.
2. To demonstrate an understanding of the relevant roles and responsibilities involved.
3. To conduct basic statistical analysis on the collected data.
4. To consolidate and report the results collected.

Suggested Readings: Faculty can decide.

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IXth SEMESTER

B Optom Internship-I	Subject Code: BOP901
Total Marks for Evaluation-100	No. of Contact Hours-1200, Credits:41

Xth SEMESTER

B Optom Internship-II	Subject Code: BOP1001
Total Marks for Evaluation- 100	No. of Contact Hours- 1200, Credits:41

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 7 hours per day and this may be more depending on the need and the healthcare setting. Internships postings can be in the following locations: Eye Hospitals, Eye clinics in general hospital, independent eye clinics, Optometric clinics in eye hospitals, general hospitals or optical showrooms, wherein the learning objective can be achieved. Short period of observation to eye care (instruments, optical, contact lens) related manufacturing set-ups, corporates and nongovernmental organizations. It is mandatory to provide exposure to all the outlined types of clinical postings as below.

S. no.	Type of clinical postings	Details	Weightage based on clinical hours	Minimum no. Of cases
1.	OPD	General OPD	30%	650
		Speciality OPD	15%	
2.	Speciality Clinics	CL	10%	20
		LVC	10%	10
		BVC	10%	10

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		Opticals Diagnostics: (Covering all specialty including Corneal, retinal, cataract etc)	10% 5%	100* 50
3.	Community Rotations	School eye screening, Adult screening, Occupational Optometry etc.	10%	10 Camps

Weightage and the number of cases is decided based on the number of weeks per year (48) and six working days and a minimum of 5 independent cases/ day for the OPD. *Opticals postings: Scientific dispensing in cases of single vision, bifocals, progressives and specialty lenses (a minimum of 25 each) should be covered. Faculty are encouraged to utilize modalities of teaching that are relevant to the health care professions for the lecture hours during internship. Emphasis on Evidence based practice should be considered. One such model is outlined here: Vertical integration in the context of medical curricula can be defined as the integration of basic knowledge such as basic science and clinical science including skills, in the clinical context. In the current discipline-based curriculum, the teaching and learning of the clinical component takes place in clinics in the traditional design of teaching. The basic knowledge such as anatomy, physiology or biochemistry is not related with the clinical condition during patient care. This lack of integrating knowledge could be bridged by introducing the concept of vertical integration wherein the facilitators take the role of introducing the cases and the students take the major role of gathering knowledge and understand the clinical scenario and apply the basic knowledge till the patient management based on evidence. Here the subject is introduced with a case and the study materials are provided to the students well in advance for them to prepare for the class (group discussions and not Regular one-way lecture). Here the students have greater opportunity of structured learning.

Assessments: Internship will be assessed using continuous and final assessments.

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1. Continuous Assessments.
2. Logbook
3. One Case Report each month
4. Attendance
5. Evaluations at the end of each specialty/diagnostic posting
6. Mid Semester Clinical Evaluation - One Full Workup to be evaluated by an Optometrist.
7. End Semester Clinical Evaluation.
8. Written Examination (MCQ/Case-based covering topics from all the courses).
9. One Full Workup to be evaluated by an Optometrist.
10. Clinical & Diagnostics reports interpretation.
11. Specialty Optometry Clinics(BVC, LVC, CL, Dispensing) Evaluation.
12. Viva Voce

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SEMESTER IX & SEMESTER X

LOG BOOK AND SKILL ASSESSMENT PAGES

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SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT

INTERNSHIP LOG BOOK

B Optom (IX & X SEMESTER)

(YEAR.....)

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STUDENT'S RECORD

Name: .....

Semester: .....

Enrollment No.....

Session: .....

..... **.....**

Signature of Principal **Signature of Student**

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DECLARATION BY THE STUDENT

Madam/Sir,

I, Mr/Ms. ..... a student of ..... bearing Registration No. ..... declare that I have completed ..... hours of Internship duty, out of the assigned ..... hours and have performed my duties in the hospital/laboratory as stated in my logbook

Students Signature

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DEPARTMENT OF OPTOMETRY
SUBHARTI COLLEGE OF ALLIED AND HEALTHCARE
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT

LOGBOOK CERTIFICATE

This is to certify that the candidate

Mr/Ms……..... registration number ……..... admitted in the academic year ……..... of ……college, has satisfactorily completed/ Not completed all requirements mentioned in this logbook for ninth/ tenth semester of Bachleor of Optometry during the period from ……to ……. in the ……Hospital/Laboratory.

Signature of the Faculty in-Charge (hospital/laboratory)

Name

Date

Signature of the Principal/Dean HoD (University/College)

Name

Date

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SKILL ASSESSMENT SHEET

Hospital/Laboratory: **Department:**

Date	Name of Experiment	Observed/ Assisted/ Performed	Signature of Supervisor/In-charge

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