

OPJS UNIVERSITY, CHURU (RAJASTHAN)



SYLLABUS

For
B.Sc. in Optometry
B.Sc.-(OPT)
(Academic Program)

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School of Para-Medical Science
OPJS UNIVERSITY, CHURU (RAJASTHAN)
2016-17



YEAR I

| Course Code | Course Title | Distribution of Marks | |
|--------------|--|-----------------------|-----------------------|
| | | Theory/ Practical | Continuous Assessment |
| BSOP-101 | Language-I | 70 | 30 |
| BSOP-102 | Language-II | 70 | 30 |
| BSOP-103 | Physical Optics | 70 | 30 |
| BSOP-104 | Geometrical Optics | 70 | 30 |
| BSOP-105 | General Anatomy & Ocular Anatomy | 70 | 30 |
| BSOP-106 | General Physiology & Ocular Physiology | 70 | 30 |
| BSOP-107 | General Biochemistry & Ocular Biochemistry | 70 | 30 |
| BSOP-108 | Physiology & Nutrition | 70 | 30 |
| BSOP-109 | Practical & Viva- Physical Optics | 100 | 50 |
| BSOP-110 | Practical & Viva- Geometric Optics | 100 | 50 |
| BSOP-111 | Practical & Viva Computer | 100 | 50 |
| TOTAL | 1250 | 860 | 390 |

YEAR II

| Course Code | Course Title | Distribution of Marks | |
|--------------|---|-----------------------|-----------------------|
| | | Theory/ Practical | Continuous Assessment |
| BSOP-201 | Optometric Optics | 70 | 30 |
| BSOP-201 | Visual Optics | 70 | 30 |
| BSOP-203 | Optometric Instruments & Clinical Exam of Visual System | 70 | 30 |
| BSOP-204 | General Pharmacology & Ocular Pharmacology | 70 | 30 |
| BSOP-205 | Microbiology & Pathology | 70 | 30 |
| BSOP-206 | Statistics and Occupational Optometry | 70 | 30 |
| BSOP-207 | Practical & Viva (Optometric Optics) | 100 | 100 |
| BSOP-208 | Practical & Viva (Visual Optics) | 100 | 100 |
| BSOP-209 | Clinical Training | 100 | 100 |
| TOTAL | | 720 | 480 |

YEAR III

| Course Code | Course Title | Theory/ Practical | Continuous Assessment (Internals) |
|-----------------------------|---|--------------------------|--|
| BOPT301 | Clinical & Investigative Optometry | 70 | 30 |
| BOPT302 | Advanced Contact Lenses & Low Vision Aids | 70 | 30 |
| BOPT303 | Community Optometry and Eye Banking | 70 | 30 |
| BOPT304 | Geriatric & Pediatric Optometry | 70 | 30 |
| BOPT305 | Clinical & Advanced Orthoptics | 70 | 30 |
| PRACTICAL COMPONENTS | | | |
| BOPT301P | Advanced Contact Lenses and Low Vision Aids | 70 | 30 |
| BOPT302P | Public Health & Community Optometry | 70 | 30 |
| BOPTT303P | Community Optometry and Eye Banking | 70 | 30 |
| BOPT304P | Clinical Investigative Optometry | 70 | 30 |
| BOPT305P | Clinical and Advanced Orthoptics | 70 | 30 |
| BOPT-IT-1 | Industrial Training | 100 | 100 |
| TOTAL | | 1200 | |

YEAR IV

| Course Code | Course Title | Theory/ Practical | Viva Voce |
|--------------------|--|--------------------------|------------------|
| BOPT-401CS | Ophthalmic Case Studies | 80 | 20 |
| BOPT-402PR | Project Reports on Community Optometry | 80 | 20 |
| TOTAL | | 200 | |

YEAR I

BSOP-101-LANGUAGE-I (BASICS OF SOFT SKILLS)

Unit1. Computer Fundamentals

- Introduction to computers, history, generations & classification of computers
- Computer memories, input & output devices
- Virus & antivirus, block diagram of computer, programming languages in computer (HLL & LLL), translation (assembler, interpreter & compiler)

Unit2. Operating systems

- Introduction to operating system,
- Attachment Unit Interface (AUI), Graphical User Interface (GUI), Character User Interface (CUI)

Unit3. Disk Operating System (DOS)

- Introduction to DOS, commands used in DOS & functioning

Unit4. MS-Window

- Introduction & features of window, window accessories like Notepad, MS-paint, Word pad, Calculator etc.

Unit5. Word Processor (MS-Word)

- Introduction, creating, saving & editing a document, tabular techniques, uses of tools & menu operations in MS-word.

Unit6. Spread Sheet (MS- Excel)

- Introduction to MS-Excel, parts of MS-Excel screen, formatting techniques, use of functions & formulae, linking & sharing of work sheets, uses of Charts & Graphs.

Unit7. Presentations (MS-Power Point)

- Introduction, working with tool bar, editing a slide, slide layouts, working with slides, slide ●Transition & Animation, inserting sounds in a power point presentation, creating tables & organization charts.

Unit 8 Internet

- Introduction, creating an e-mail ID on internet, uses of internet in e-mail, World Wide Web (www), chats etc.

BSOP-102 LANGUAGE-II (COMMUNICATION SKILLS FOR PROFESSIONALS)

Unit1. Introduction:

- Communication
- Types of Communication
- Importance & Principles of Communication
- Barriers in Communication

Unit2. Review of Grammar

- Types of Sentence
- Parts of Speech in brief
- Transformation and Synthesis of Sentences
- Verb and Tense Forms
- Voice
- Direct & indirect speech
- Phonetics

Unit3. Vocabulary

- Medical Terminology
- Idioms and Phrases
- Common Errors
- Use of Dictionary for Learning to Pronounce
- Word Formation by adding Prefixes & Suffixes

Unit4. Spoken English

- Audience Psychology & Presentation Skills
- Using Non-verbal Communication
- Interview techniques
- Discussion
- Debate
- Telephonic Conversation

Unit5. Writing Skills

- Précis Writing
- Letter Writing
- Curriculum Vitae Writing
- Listening, Reading, Comprehension (Exercise of prescribed short answers)
- Preparation of Report
- Note Taking and Note Making

BSOP-103-PHYSICAL OPTICS

Unit1. Basic Principles of Light

- Introduction, properties, dual nature of light, simple harmonic motion
- Speed, wave length & frequency of light, interrelation between these.
- Fermats' principle- laws of relation & refraction at a plane surface using Fermats' principle

Unit2. Reflection and Refraction

- Introduction, definition and basis differences
- Huygens' Principle – laws of reflection and refraction at plane and spherical Surfaces
- Snells' law, relative and absolute refractive indices, total internal reflection and critical angle, refraction by plane parallel slab of glass, molecular basis of reflectivity (basic index)
- Geometrical path length & optical path length of rays, concept of wave fronts & rays, concept of vergence divergence, convergence
- Refraction by spherical surfaces- convex & concave, derivation of vergence equation, focal points, deoptee power, image point, lateral & axial magnification, simple numerical.

Unit3. Lens

- Thin Lens- shapes, derivation of lens makers' formula, thin lens vergence equation, equivalent focal length of two thin lenses separated by a distance & placed in contact, lateral magnification of thin lenses in contact, simple numerical, concept of reduced systems.
- Thick Lens- Cardinal points & planes, front & back vertex power, matrix theory in paraxial optics to locate positions of cardinal planes
- Different types of aberrations & their effects.
- Prism- dispersion of prism, reflecting prisms, prisms dioptries

Unit4. Interference

- Coherence- path and phase difference, theory of interference
- Fringes intensity distribution infringes, Young's double slit experiment, Fresnels' biprism, Lloyds' error experiments; visibility of fringes
- Interference in thin films due to reflected and transmuted light
- Interference in wedge shaped films, Newton's ring experiment, color of thin films, thin film anti-reflection wating and filters

Unit5. Diffraction & Scattering

- Diffraction by single slit; double slit, multiple slit- grating, circular aperture, amplitude & intensity distribution (final expressions only)
- Circular aperture- airy pattern, resolution by circular apertures
- Diffraction grating- reflection, transmission, amplitude & phase gratings (definitions in brief)
- Grating dispersion & disperse power, spectral resolution; zone plates, Rayleigh's scattering & Raman scattering.

BSOP-104- GEOMETRICAL OPTICS

Unit6. Polarization & Crystal Optics

- Concept of polarization, linear, circular, elliptical polarization (qualitatively),
- Plane of polarization & vibration, degree of polarization, polarizers, analyzers,
- Production of polarized light, birefringence, calculate crystal, veal prism, Wallaston prism, retarders – full, half & quarter wave plates, analysis of light of unknown polarization.
- Principles of LASERS, basic principles of Holography

Unit7. Optics of Ocular Structures

- Cornea and aqueous, crystalline lens, vitreous, schematic and reduced eye
- Sturm Conoid, corneal curvature and thickness
- Keratometry
- Curvature of the lens and ophthalmophakometry
- Axial and axis of the eye

Unit8. Refractive Anomalies and Their Causes

- Etiology of refractive anomalies
- Contributing variabilities and their ranges
- Populating distributions and their ranges
- Optical component measurement
- Growth of eye in relation to refractive errors
- Emmetropia, Myopia, Hyperopia, Astigmatism, Anisometropia and Aniseikonia
- Presbyopia; Aphakia and pseudophakia;
- Correction and management of Amblyopia

Unit9. Accommodation and Convergence

- Accommodation- Definition of accommodation, changes in the eye during accommodation, anomalies of accommodation
- Convergence– Definition, components & anomalies of convergence,
- Relationship between accommodation and convergence, A/C Ratio, ocular refraction versus spectacle refraction
- Ocular accommodation versus spectacle accommodation
- Spectacle magnification and relative spectacle magnification
- Retinal image blur
- Depth of focus and depth of field

Unit10. Objective and Subjective Refraction

- Retinoscopy – procedure, speed of reflex and optimum condition, dynamic and static Retinoscopy
- Subjective refraction- finding best vision sphere, determine axis and power of cylinder by JCC, refine sphere, duochrome test, binocular balancing
- Fogging method
- Difficulties in objective tests and their avoidance
- Transposition of lenses
- Spherical equivalent
- Prescribing prism
- Binocular Refraction

BSOP-105-GENERAL ANATOMY & OCULAR ANATOMY

SECTION-A GENERAL ANATOMY

Unit1. Introduction to Anatomy:

- Introduction to anatomy
- Surface anatomy, cadverial anatomy, anatomical planes
- Anatomical movements, anatomical positions.
- Cells and Tissues, their types
- Structure of an animal cell with functions of the cell organelles, functions of cells and tissues
- Clinical terminologies related to above

Unit2.Musculo-Skeletal System:

- Definition/introduction of skeletal system, bones and their types
- Structure of a cancellous bone and cartilaginous bone
- Classification of bones on the basis of shape and origin
- Functions of musculo-skeletal system, introduction to tendons
- Ligaments and cartilages
- Joints: definition of joints, functions, types of joints, cartilaginous and fibrous joints, sutures
- Synovial joints and their subtypes with suitable examples, fontanelles etc.
- Relevant clinical notes

Unit3.Cardiovascular System:

- Heart-size, shape, location, internal structure, arterio-venous supply
- The Systemic or greater circulation & lesser or pulmonary circulation
- Branches of aorta-brachiocephalic artery, subclavian artery, common carotid artery, Circle of Willis
- Axillary artery, superficial palmar arch, femoral artery, internal iliac artery, inferior vena cava, portal vein
- Great saphenous vein & dural venous sinuses
- Relevant clinical notes

Unit4.Gastro-intestinal System:

- Anatomical structure of oral cavity (Teeth, lips, tongue, hard palate, pharynx, tonsil, salivary glands, Waldeyer's ring)
- Esophagus, stomach, small and large intestine, liver, gall bladder, pancreas, spleen- overview of gross anatomy
- Introduction to regions of abdominal cavity
- Relevant clinical notes

Unit5.Respiratory System:

- Overview of anatomical structures of respiratory system- nose, nasal cavity, pharynx, larynx, trachea, lungs & bronchial tree (including histology of trachea, lung and pleura)
- Para-nasal air sinuses
- Clinical terminologies related to Respiratory System

Unit6.Urinary System:

- Anatomical overview of excretory system-kidney, ureter, urinary bladder, male and female urethra with histology perspective of kidney, ureter and urinary bladder
- Clinical terminologies pertaining to excretory system

Unit7.Reproductive System:

- Anatomical parts of male reproductive system- scrotum, testis, vas deferens, epididymis, prostate (gross & histology), ejaculatory duct
- Parts of female reproductive system- perineum, vagina, uterus, fallopian tubes, ovary (gross & histology), gross anatomy of mammary glands.
- Clinical terminologies related to reproductive system

Unit8.Endocrine Glands:

- Gross anatomical structure of pituitary and thyroid gland, anatomical overview of thyroid, parathyroid gland, suprarenal gland
- Clinical terminology related to Endocrine System

Unit9.Nervous System:

- Introduction to Central and Peripheral Nervous System, Neuron, Classification of Nervous System, gross anatomy of cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerves
- Meninges and subdural spaces, ventricles & cerebrospinal fluid, basal ganglia, nuclear ganglia
- Blood supply of brain, cranial nerves
- Sympathetic and parasympathetic nervous system
- Clinical terminologies related to Nervous System

Unit10.Sense Organs:

Gross anatomical structure of Eye, Ear, Nose, Tongue and Skin, Lacrimal apparatus, blood and nerve supply to the above parts

- Clinical terminologies related to above

SECTION-B OCULAR ANATOMY

Unit1. Orbit & Orbital Cavity

- Bony orbit Size, shape & relations, walls, base, apex of the orbit
- Orbital fascia- fascial bulbi, fascial sheaths of extraocular muscles, intermuscular septa
- Spaces of orbit- orbit fat & reticular tissue, apertures at the base of orbit
- Contents of the orbit- orbital nerve (oculomotor , trochler, abducent, trigeminal & facial nerves) & their functional components, course & distribution, clinically applied aspects

Unit2. Cornea

- Layers & peculiarities, blood supply & nerve supply of cornea, corneal transparency
- Lens, Zonules- Structure. Of lens
- capsule, Ant. Epithelium, lens fibers (structured & zonal arrangement)
- Gross structure of Ciliary zonules, ,arrangement of zonules fibers
- Uveal Tract & its vascular supply, macroscopic & microscopic appearance of Iris, macroscopic structure of ciliary body, macroscopic structure of chloride, blood supply to uveal structure (short & long posterior artery & anterior artery)
- Venous drainage.

Unit3. Viterous Body, Sclera and Anterior Segment of Eye

- Vitreous Body- main masses of vitreous, base of the vitreous, Hyaloidean vitreous, Vitreous cells
- Sclera- anterior, posterior & middle apertures, episclera, sclera proper., lamina fusca, blood supply of the sclera, nerve supply of the sclera.
- Anterior chamber and its angle- angle of the anterior chamber, trabecular meshwork, canal of Schlemm, Schwalbe's line, drainage of aqueous humor

Unit4. Retina

- Gross anatomy & microscopic structure of retina of fovea centralize
- Blood retinal barrier
- Anatomy of optic nerve- optic chaisma, optic tracts, lateral geneculate Body, optic radicalism, visual cortex, arrangement of nerve fibers, blood supply of visual pathways (Arterial circle of willis & its branches)

Unit5. The Ocular motor system

- Extraocular muscles, nerve supply, motor nuclei, supra nuclear motor centers, the 10aemoglob & ciliary muscle, anatomy of sphincter & dilator muscle, ciliary muscle- anatomy & types
- The nerve supply of the eye ball.
- The lachrymal apparatus- Lachrymal gland, palpebral part, ducts of lachrymal gland, structure of the lachrymal gland, blood supply & nerve supply of the lachrymal gland, lachrymal passages

Unit6. Anatomy of the Ocular Adnexa & glands

- Lids – Structures of the lids- glands of the lids, meibomaian glands, glands of Zela and Glands of Moll, blood Supply of the lids, lymphatic drainage of the Lids,
- Conjunctiva- palpebral conjunctiva, bulbar conjunctiva, conjunctival fornix, microscopic structure of the conjunctiva
- Conjunctival Glands- Krause's Glands, Wofring's Glands, Henley's Glands, Manz Glands
- Blood & nerve Supply of the conjunctiva, caruncle, plica semilunaris

BSOP-106-GENERAL PHYSIOLOGY & OCULAR PHYSIOLOGY

SECTION-B PHYSIOLOGY

Unit11.Introduction to Physiology:

- Intercellular components, intercellular communications, functions of a cell.
- Movement of substances and homeostasis

Unit12.Blood

- Composition and functions of blood
- Plasma proteins – normal values, origin and functions
- Hemoglobin – functions, compounds and derivatives
- Abnormal hemoglobin-overview
- Erythrocyte Sedimentation Rate (ESR) and its significance
- Hematocrit; PCV; MCV; MCH; MCHC
- Blood Volume – normal values, regulation
- Blood coagulation – factors, process; anticoagulants; Prothrombin time; clotting time; bleeding time
- Blood groups- ABO systems and Rh factors; blood transfusion

Unit13.Gastrointestinal System:

- Saliva – Composition, functions, control of secretion
- Gastric juice – Composition, mechanism of secretion, functions, regulation of secretion,
- Pancreatic juice – Composition, functions, regulation
- Liver & Gall Bladder: Composition & functions of bile, control of secretion, functions of gall bladder, gall stones, jaundice, functions of liver & L.F.T
- Small intestine – Composition & regulation of intestinal juice, functions of intestinal juice.

Unit14.Respiratory System

- Functions of respiratory system, mechanics of respiration
- Lung volumes and capacities – definition, normal values, their measurement and clinical importance, dead space
- Diffusion of gases across alveo-capillary membrane; diffusing capacity; pulmonary circulation
- Oxygen & carbon dioxide transport in blood
- Pressure changes during ventilation, pressure volume relationship including surfactant and compliance, airway resistance; Control of respiration
- Neural control, chemical control, response to exercise, periodic breathing; Lung function tests.

Unit15.Neuro-Muscular Physiology

- Electrical properties of cell membrane
- Physiology of nerves and neuromuscular junction
- Neuro muscular transmission
- Mechanism of muscle contraction and relaxation; isotonic & isometric contraction; energy sources and metabolism; motor unit
- Involuntary muscles – cardiac and smooth muscles.

Unit16.Cardiovascular System

- Structure and properties of heart muscles and nerve supply of Heart
- Structure and functions of arteries, capillaries and veins
- ECG – principles of normal recording, normal waves & their interpretations, clinical uses of ECG
- Cardiac cycle and heart sound, factors affecting Heart Rate and its regulation
- Blood pressure and its regulation; physiological variation; factors controlling blood pressure
- Differences between artery & vein

Unit17.Excretory System

- Functional anatomy of kidney; nephron-structure, parts, function
- Glomerular filtration – filtration barrier, forces governing filtration, measurement
- Tubular functions- reabsorption, secretion
- Tm values
- Regulation of ECF – volume; osmolarity and electrolytes
- Acid base balance
- Micturition, normal and abnormal constituents of Urine
- Renal function tests and common nephropathies

Unit18.Reproductive System

- General consideration of reproduction
- Development of puberty
- Male Sex Hormones
- Spermatogenesis
- Female sex hormones
- Menstrual cycle
- Ovulation, pregnancy and lactation
- Function of placenta.

Unit19.Nervous System and Special Senses

- Electron microscopic structure of neurons
- Conduction velocity of nerve impulse in relation to myelination and diameter of nerve fibers
- Properties of nerve fibers-excitability, conductivity, all-or-none law, accommodation, adaptation, summation, refractory period, indefatigability
- Injury to peripheral nerves- brief idea about degeneration and regeneration
- Brief about central nervous system and its function with special reference to cerebral and visual cortex
- Automatic nervous system- neurotransmitter and receptors, cholinergic neurons & receptors, receptor agonist & antagonist, physiological effect of ANS sympathetic & parasympathetic response
- Autonomic Reflexes; autonomic control by higher centers; sensory physiology of taste and smell organ.

SECTION-B OCULAR PHYSIOLOGY

Unit7. Microscopic Structure of the Eye

- Pupil- normal pupil, physiological changes in pupil size, isocoria, 12aemoglob unrest, hippies. 12aemoglob reflex (light reflex, near reflex, darkness reflex, psycho sensory reflex, lid closure reflex etc.
- Cornea: Brief overview of histological structure of cornea, the corneal transparency & hydration, regulation of corneal transparency & hydration
- Corneal vascularisation, Maurice theory & Goldman's theory
- Brief overlook of uvea, uveal meshwork, uveo-scleral drainage & Schlemm's canal switch
- Basic idea about human lens, functions, lens transparency & lens culture, changes in ageing lens, overview of cataract
- Formation of aqueous humour, drainage & circulation of aqueous humor, rate of production & flow, functions of aqueous humour.
- Composition & distribution of vitreous humour, physiology & function of vitreous humour, optical role of vitreous humour.
- Retinal structure-layers of retina, brief idea about rod & cones, organization of retina, function of retina.
- Physiology of optic nerve, papilledema of optic nerve, optic atrophy

Unit8. Ocular Circulation

- Vascular structure of the eye – ocular circulation, blood-ocular barrier (Blood-retinal, blood Vitreous & blood aqueous barrier)
- Regulation of ocular circulation.

Unit9. Ocular Muscles

- Overview of the protective mechanism of the eye
- Blinking – muscles of lid closer & lid opening (orbicularis oculi, levator palpebrae, Muller's muscle, blinking reflexes.
- Lacrimation –
 - Lacrimal glands
 - Pre corneal tear film
 - Chemistry of lachrymal secretion tears film
 - Tear film dynamics (secretion of tear, formation of tear, retention & redistribution of tear, displacement phenomena, evaporation from tear film, drying & breakup of tear film, dynamic events, during blinking, and elimination of tear.)

Unit10. The Ocular Motor System –

- Extra ocular muscles their function & nerve supply
- Mechanics of actions of extra ocular muscles –cross sectional area of muscle, length of muscle, arc of contact, muscle plane, muscle axis of rotation
- Physiology of ocular movement- basic kinematics (position of gaze, Fick's axes)
- Ocular Movement-
 - Monocular movements (adduction, abduction, supraduction, infraduction, incycloduction & excycloduction), infra nuclear control of eye movements
 - Binocular Movements- VERSIONS- (saccadic & pursuit movement, position maintenance movements, stabilization movements & their characteristics)
 - VERGENCES – (Convergence, divergence, vertical vergence), Supra nuclear control of eye movements.
 - Intraocular pressure – Features of normal IOP, factors influencing the IOP, control of IOP, measurement of IOP

Unit11. Accommodation of Eye

- Far point, near point, range & amplitude of accommodation
- Mechanism of accommodation – Increased tension theory, Relaxation theory, Role of lens capsule, Gullstrand mechanical model of accommodation, stimulus for accommodation
- Ocular changes in accommodation.
- Changes in accommodation with age (Presbyopia)
- Nervous mechanism for accommodation
- Color vision- physiological, photochemical & neurological basis of color vision, electrophysiology of color vision
- Granit's modulator and dominator theory, Purkinje phenomenon. Young- Helmholtz theory
- Types of color defects
- Color blindness
- Neural analysis
- Geniculate cortex-structure & electrophysiology of geniculate cortex
- Retinal projection and detail idea about visual cortex & function of visual cortex.

Unit12. Visual perception

- Higher integrative activity, Binocular perception, stereoscopic depth perception.
- Neurophysiology of perception – Higher visual pathways (primary visual Pathway to cerebral center, Lateral Geniculate body, non-geniculate targets for retinofugal input, visual center)
- Neurophysiology of perception- spatial analysis, double pathway to higher visual centers
- Physiology of vision- visual acuity, visual angle, components of visual acuity (minimum visible, resolution, recognition hyperacuity), factors affecting visual acuity, measurement of visual acuity

- Contrast Sensitivity-types (spatial & temporal contrast sensitivity), neural mechanism, measurement of contrast sensitivity (Arden gratings, Cambridge low contrast gratings, Pelli- Robson chart)
- Light & Dark adaptation- dark adaptation curve, mechanism of dark adaptation, factors influencing dark adaptation, time course of light adaptation, mechanism of light adaptation, Rod vs. cone light adaptation, Parkinje shift of spectral sensitivity
- Binocular vision- grades of binocular vision (simultaneous, fusion & stereopsis), advantages of binocular vision, visual direction & horopter, binocular fusion, dichoptic stimulation, depth perception, integration of motor & sensory system

Unit13. Electrodiagnostic Tests

- ERG, EOG, VER

BSOP-107-GENERAL & OCULAR BIOCHEMISTRY

Unit1. Basics of General Biochemistry

- Concept of metabolism of carbohydrate, protein & fat
- Process of glycolysis & glycogenolysis, TCA cycle & its significance
- Non- protein nitrogen, nitrogen balance

Unit2. Amino Acids

- Amino acids-structure, function, classification and properties
- Metabolism of amino acids, transamination, deamination, process of β -oxidation of unsaturated fatty acid, α & ω oxidation overview

Unit3. Protein

- Structure of protein
- Primary, secondary, tertiary & quaternary structures & the bond involved in formation of protein

Unit4. Enzymes

- Brief outline about the general characteristics & classification, factors affecting enzymatic activity, kinetics of enzyme, km. Michaelis Menten equation, Line Weaver Burk plot.
- Enzyme Inhibition – Reversible & Irreversible

Unit5. Oxygen Transporting Protein

- Hemoglobin & Myoglobin – Structure & their characteristics
- Comparison between 15aemoglobin & myoglobin
- Oxygen transporting mechanism of Hemoglobin, affinity for Oxygen, Bohr's effect

Unit6. Vitamins

- Introduction, definition and significance
- Water & Fat soluble Vitamins
- Vitamins- A,D,E,KP,C B complex- source, daily requirement, metabolism, functions, & deficiency

Unit7. Hormones

- Basic outline of hormone action, physical & chemical characteristics of hormone, types of hormone, general mechanism of hormone action via messenger system
- Source & importance of different hormones-STH, ACTH, GTH , T4, parath hormone, Insulin, Glucagon, Glucocorticoid, Mineralocorticoid, Melatonin, Estrogen, Progesteron, Testosterone & HCG

UnitUnit8. Ocular Biochemistry

- Cornea
 - Biochemical composition of cornea, sources of nutrients
 - Metabolic pathway in cornea- glycolysis, HMP shunt
- Tear film- Functions of tear film. Different layers of Tear film. Chemical composition of tears. Tear film abnormalities. Tests for film Adequacy.
- Lens – Biochemical composition of lens, lens protein, types & Characteristics of lens protein, lens metabolism (Carbohydrate & protein Metabolism)
- Cataract due to biochemical defects of lens, Antioxidant mechanism in the lens

Unit9. Biochemistry of the Visual Process

- Photopigments – Rhodopsin & Iodopsin, chemical nature of Rhodopsin, visual cycle (bleaching of Rhodopsin, Transducin cycle, role of phosphodiesterases)

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- A. Richard S. Snell Michael A. Lemp, Clinical Anatomy of the Eye, 1998
- B. Lee Ann Remington, Clinical Anatomy of the Visual System, 2011
- C. Raul Martin Herranz, Rosa M. Corrales Herran, Ocular Surface: Anatomy and Physiology, Disorders and Therapeutic Care, 2012.

BSOP-108-PHYSIOLOGY & NUTRITION

Unit1.Blood

- Composition and functions of blood
- Plasma proteins – normal values, origin and functions
- Hemoglobin – functions, compounds and derivatives
- Abnormal hemoglobin-overview
- Erythrocyte Sedimentation Rate (ESR) and its significance
- Hematocrit; PCV; MCV; MCH; MCHC
- Blood Volume – normal values, regulation
- Blood coagulation – factors, process; anticoagulants; Prothrombin time; clotting time; bleeding time
- Blood groups- ABO systems and Rh factors; blood transfusion

Unit2.Gastrointestinal System:

- Saliva – Composition, functions, control of secretion
- Gastric juice – Composition, mechanism of secretion, functions, regulation of secretion,
- Pancreatic juice – Composition, functions, regulation
- Liver & Gall Bladder: Composition & functions of bile, control of secretion, functions of gall bladder, gall stones, jaundice, functions of liver & L.F.T
- Small intestine – Composition & regulation of intestinal juice, functions of intestinal juice.

Unit3. Study of Nutrition

- 1.1 Introduction and definition
- 1.2 Interrelation between Health and Nutrition
- 1.3 Classification of Food
- 1.4 Orientation to nutrients
 - 1.4.1 Carbohydrates
 - 1.4.2 Proteins
 - 1.4.3 Fat
 - 1.4.4 Vitamins
 - 1.4.5 Minerals
- 1.5 Caloric requirement of water and minerals

Unit4. Nutritive Value of Food

- 2.1 Nutritive Value of cereals, pulses and Vegetables
- 2.2 Nutritive Value of Milk and Milk products
- 2.3 Nutritive Value of Fats and Oils
- 2.4 Nutritive Value of Sugars

Unit5. The Balanced Diet

- 3.1 Definition
- 3.2 Factors of Diet Planning
- 3.3 Nutritional requirement of special groups/vulnerable groups
- 3.4 Child Nutrition

Unit6 Malnutrition

- 4.1 Malnutrition and Under nutrition
- 4.2 Factors of Malnutrition
- 4.3 Vitamin deficiency
- 4.4 Protein Calorie Malnutrition
- 4.5 Cultural factors in Nutrition
- 4.6 Food Adulteration and prevention
- 4.7 Nutrition Education

SECOND YEAR

BSOP-201- OPTOMETRIC OPTICS

Unit1. Basic Principles of Light

- Introduction, properties, dual nature of light, simple harmonic motion
- Speed, wave length & frequency of light, interrelation between these.
- Fermats' principle- laws of relation & refraction at a plane surface using Fermats' principle

Unit2. Reflection and Refraction

- Introduction, definition and basis differences
- Huygens' Principle – laws of reflection and refraction at plane and spherical Surfaces
- Snells' law, relative and absolute refractive indices, total internal reflection and critical angle, refraction by plane parallel slab of glass, molecular basis of reflectivity (basic index)
- Geometrical path length & optical path length of rays, concept of wave fronts & rays, concept of vergence divergence, convergence
- Refraction by spherical surfaces- convex & concave, derivation of vergence equation, focal points, deportee power, image point, lateral & axial magnification, simple numerical.

Unit3. Lens

- Thin Lens- shapes, derivation of lens makers' formula, thin lens vergence equation, equivalent focal length of two thin lenses separated by a distance & placed in contact, lateral magnification of thin lenses in contact, simple numerical, concept of reduced systems.
- Thick Lens- Cardinal points & planes, front & back vertex power, matrix theory in paraxial optics to locate positions of cardinal planes
- Different types of aberrations & their effects.
- Prism- dispersion of prism, reflecting prisms, prisms dioptries

Unit4. Interference

- Coherence- path and phase difference, theory of interference
- Fringes intensity distribution infringes, Young's double slit experiment, Fresnels' biprism, Lloyds' error experiments; visibility of fringes
- Interference in thin films due to reflected and transmuted light
- Interference in wedge shaped films, Newton's ring experiment, color of thin films, thin film anti-reflection wating and filters

Unit5. Diffraction & Scattering

- Diffraction by single slit; double slit, multiple slit- grating, circular aperture, amplitude & intensity distribution (final expressions only)
- Circular aperture- airy pattern, resolution by circular apertures
- Diffraction grating- reflection, transmission, amplitude & phase gratings (definitions in brief)
- Grating dispersion & disperse power, spectral resolution; zone plates, Rayleigh's scattering & Raman scattering.

Unit6. Polarization & Crystal Optics

- Concept of polarization, linear, circular, elliptical polarization (qualitatively),
- Plane of polarization & vibration, degree of polarization, polarizes, analyzers,
- Production of polarized light, birefringence, calculate crystal, veal prism, Wallaston prism, retarders - full, half & quarter wave plates, analysis of light of unknown polarization.
- Principles of LASERs, basic principles of Holography

BSOP-202- VISUAL OPTICS

Unit1. Optics of Ocular Structures

- Cornea and aqueous, crystalline lens, vitreous, schematic and reduced eye
- Sturm Conoid, corneal curvature and thickness
- Keratometry
- Curvature of the lens and ophthalmophakometry
- Axial and axis of the eye

Unit2. Refractive Anomalies and Their Causes

- Etiology of refractive anomalies
- Contributing variabilities and their ranges
- Populating distributions and their ranges
- Optical component measurement
- Growth of eye in relation to refractive errors
- Emmetropia, Myopia, Hyperopia, Astigmatism, Anisometropia and Aniseikonia
- Presbyopia; Aphakia and pseudophakia;
- Correction and management of Amblyopia

Unit3. Accommodation and Convergence

- Accommodation- Definition of accommodation, changes in the eye during accommodation, anomalies of accommodation
- Convergence– Definition, components & anomalies of convergence,
- Relationship between accommodation and convergence, A/C Ratio, ocular refraction versus spectacle refraction
- Ocular accommodation versus spectacle accommodation
- Spectacle magnification and relative spectacle magnification
- Retinal image blur
- Depth of focus and depth of field

Unit4. Objective and Subjective Refraction

- Retinoscopy – procedure, speed of reflex and optimum condition, dynamic and static Retinoscopy
- Subjective refraction- finding best vision sphere, determine axis and power of cylinder by JCC, refine sphere, duochrome test, binocular balancing
- Fogging method
- Difficulties in objective tests and their avoidance
- Transposition of lenses
- Spherical equivalent
- Prescribing prism
- Binocular Refraction

PRACTICAL

1. To determine the wavelength of a monochromatic light source with the help of Fresnel's Biprism
2. To determine the radius of curvature of convex surface of a lens by Newton's ring method
3. To determine Planck's constant using photocell.
4. To study the diffraction through a single slit & to determine its width.
5. To determine the slit width & the separation between the slits of a double slit system from its, Fraunhofer diffraction pattern.
6. Determination of the wavelength of monochromatic light using diffraction grating.
7. To calibrate a Polarimeter & hence to determine the unknown concentration of sugar solution.
8. To determine the wavelength of the Laser source by forming diffraction pattern

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- A. Michel Millodot. "Dictionary of Optometry and Visual Science", Oxford: Butterworth Heinemann. 2000.
- B. Feynman / Leighton / Sands The Feynman Lectures on Physics (three volumes)
- C. PSSC (Uri Haber-Schaim, John H. Dodge, James A. Walter) Physics

BSOP-203- OPTOMETRIC INSTRUMENTS & CLINICAL EXAM OF VISUAL SYSTEM

Unit1. Trial set, Trial frame design, near vision difficulties with units and trial frame

Unit2. Types of lenses, their affectivity & uses in ophthalmology

Unit3. Retinoscopy

Unit4. Transposition

Unit5. Refractive errors:

- Myopia
- Hypermetropia
- Astigmatism
- Presbyopia
- Aphakia
- Pseudophakia
- Anisometropia
- Aniseikonia
- Amblyopia

Unit6. Types of Frames

- Spectacle Frame
- Materials: Plastics, Metals
- Types Frame Measurements

Unit7. The Boxing System

- The Datum System
- Facial Measurement
- The IPD, Visual axes
- Single Vision
- Measuring heights: Bi -focal, Progressive

Unit8. Ophthalmic Lens Material

- Special types of lenses, Toric, cosmetic and therapeutic lenses, Lens Materials
- Properties and parameters of the materials used for contact lenses
- Glass, Plastic, Polycarbonate Lens surfacing
- Ophthalmic Lens Coating, Absorptive Lenses, Impact Resistant Lenses

Unit9. Ophthalmic Instruments:

- Slit Lamp
- Keratometer
- Tonometer
- Perimeter
- Lensometer
- Ophthalmoscope
- Retinoscope
- Synoptophore

Practical Component

OPTOMETRIC INSTRUMENTS & CLINICAL EXAM OF VISUAL SYSTEM

- Retinoscopy
- Brightness Acuity tester. Potential Acuity meter test
- Pupilometer measurement,
- Direct Ophthalmoscopy, Indirect Ophthalmoscopy
- Slit lamp techniques
- Tonometry, RAF ruler test, Synoptophore, Color vision test, Keratometry

BSOP-204- GENERAL PHARMACOLGY & OCULAR PHARMACOLOGY

Unit1. Diseases of the Eyelids & Lacrimal Apparatus

Classification, causes and investigations of the following diseases of the eye

- Ptosis, Blepharitis
- Ulcerative
- Squamous
- Stye
- Chalazion
- Trichiasis
- Entropion
- Ectropion
- Trichiasis
- Lacrimal pump
- Methods of Lacrimal evaluation
- Congenital and developmental anomalies of lacrimal system
- Lacrimal obstructions- Lacrimal sac tumours; Lacrimal trauma; Ectasia and staphyloma
- Scleritis and episleritis

Unit2. Diseases of the Orbit

Classification, causes and investigations of the following diseases of the eye:

- Orbital Cellulitis, Proptosis, Enophthalmos & Exophthalmoses
- Lacrimal Apparatus
- Chronic Dacryocystitis
- Acute dacryocystitis
- Orbital tumors; Orbital trauma
- Paralytic Squint
- Synoptophore
- Dacryocystectomy
- Dacryocystorhinostomy
- Ocular injury: Closed globe injury (contusion, lamellar laceration)
- Open globe injury (rupture, laceration, penetrating injury, perforating injury)
- Mechanical injuries (Extraocular foreign body, blunt trauma, sympathetic ophthalmitis)
- Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational)
- Clinical approach towards ocular injury patients
- Methods of orbital examination

Unit3. Diseases of the Conjunctiva

- Acute Catarrhal or Mucopurulent Conjunctivitis
- Purulent conjunctivitis
- Ophthalmia Neonatorum
- Membranous Conjunctivitis
- Trachoma
- Phlectenular Conjunctivitis
- Spring vernal Conjunctivitis- Pingecula, Pterygium, Xerosis, Bitot's Spot.

Unit4. Diseases of the Uveal Tract & Vitreous Body & Retinal Disorders:

- Congenital anomalies-; Primary and secondary diseases of iris and ciliary body
- Tumours; Anomalies of pulillary reactions
- Congenital anomalies of choroids
- Diseases of choroids
- Tumours
- Vitreous developmental abnormalities
- Hereditary hyaloid retinopathies
- Juvenile retinoschisis

- Asteroid hyalosis; Cholesterolosis
- Vitreous haemorrhage
- Blunt trauma and the vitreous inflammation and vitreous parasitic infestations
- Pigment granules in vitreous
- Vitreous complications in cataract surgery
- Retinal vascular diseases- diseases of choroidal vasculature, Bruch's membranes and retinal pigment epithelium
- Retinal tumours- Retinoblastoma, Phakomatoses
- Retinal vascular anomalies
- Retinal and optic nerve head astrocytomas
- Other retinal disorders
- Retinal inflammations
- Metabolic diseases affecting the retina
- Hereditary macular disorders including albinism, peripheral retinal degenerations, retinal holes and detachments
- Intraocular foreign bodies
- Photocoagulation

Unit5. Diseases of the Cornea

- Congenital anomalies- Megalocornea; microcornea; corneaplana, congenital cloudy cornea
- Inflammations of the cornea
- Topographical classifications- ulcerative keratitis and non-ulcerative
- Etiological classification- infective, allergic, trophic, traumatic, idiopathic
- Infective Keratitis
- Allergic keratitis (Phlyctenular Keratitis)
- Degenerations- classifications, arcus senilis, vogt's white limbal girdle, hassall henle bodies, lipoid keratopathy, band shaped keratopathy, Salzmann's nodular degeneration, droplet keratopathy, pellucid marginal degeneration
- Dystrophies- Reis Buckler dystrophy, recurrent corneal erosion syndrome, granular dystrophy, lattice dystrophy, Macular dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, congenital endothelial dystrophy, Keratoconus, keratoglobus
- Corneal oedema
- Corneal opacity
- Corneal vascularisation
- Penetrating keratoplast
- Sclera and Episclera - Episcleritis and Scleritis

Unit6. General Pharmacology

- Definitions and different branches of Pharmacology
- Routes of drug administration
- Absorption, distribution, metabolism and excretion of drugs
- General mechanism of drug action
- Instruments used in Pharmacology
- Basic aspects of clinical trials.

Unit7. Drugs Acting on Nervous System

- General anesthetics- Anxiolytic and hypnotic drugs
- Psychotropic agents- epilepsy and anticonvulsant drugs
- Narcotic analgesics and antagonists
- Centrally acting muscle relaxation and antiparkinsonism agents
- Analgesics, antipyretics, anti-inflammatory agents
- Central nervous system stimulant
- Local anesthetics- autonomic nervous system and neurohumoral transmission
- Cholinergic or parasympatholytic drugs
 - Anticholinergic or parasympathomimetic drugs
 - Adrenergic or sympathomimetic drugs

- Anti adrenergic or sympatholytic drugs
- Drugs acting on autonomic ganglion
- Neuromuscular blockers.

Unit8. Drugs Acting on Respiratory System & Cardiovascular System

- Bronchodilators and analeptics
- Nasal decongestants, expectorants and antitussive agents
- Antiarrhythmic drugs
- Cardiotonics & Antianginal drugs
- Antihypertensive drugs
- Drugs used in atherosclerosis.

Unit9. Drugs Acting on Blood and Blood Forming Organs

- Haematinics- Coagulants, anticoagulants, blood and plasma expanders.

Unit10. Opioid Analgesics

- Endogenous opioid peptides
- Opioid receptors
- Effects of clinically used opioids
- Morphine and related opioid agonists
- Acute opioid toxicity
- Opioid agonist & antagonist
- Therapeutic uses of opioid analgesics.

Unit11. Ocular Pharmacology

- Pharmacokinetics & Pharmacodynamics
- Toxicology of ocular therapeutic agents
- Pharmacokinetics
- Therapeutic and diagnostic applications of drugs in ophthalmology
- Chemotherapy of Microbial Diseases in the Eye
- Therapeutic uses of anti-bacterial, anti-viral, anti-fungal & anti-protozoal agents
- Antiglaucoma drugs
- Use of autonomic agents in the eye
- Use of immune modulatory drugs for ophthalmic therapy
- Drugs and biological agents used in ophthalmic surgery
- Agents used to assist in ocular diagnosis
- Use of anesthetics in ophthalmic procedure
- Dyes used in Ophthalmology-fluorescein, rose Bengal, trypan blue,
- Steroids and NSAIDS

Unit12. Ocular Pharmacology

- Basic Pharmacology
- Introduction to Ocular Pharmacology
- Pharmacokinetics and Pharmacodynamics
- Mydriatics and Cycloplegics
- Chemotherapy: Antibacterial, Antiviral and Antifungal Drugs
- Antiglaucoma Drugs
- Viscoelastics, Botulinum Toxin

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- Feist RM, Lim JI, Joondeph BC, Pflugfelder SC, Mieler WF, Ticho BH, Resnick K. "Penetrating ocular injury from contaminated eating utensils", Archives of Ophthalmology. 1991 Jan; 109 (1): 23 –30.
- Mannfred A Hollinger (2003)."Introduction to Pharmacology. CRC Press. P 4.

BSOP-205- MICROBIOLOGY & PATHOLOGY

Unit1. General & Clinical Morphology

● Introduction and definition, branches of microbiology, introduction and definition of microbes, virus, bacteria and microorganisms, size, shape and structure of bacteria and virus, use of microscope in the study of bacteria

Unit2. Growth and Nutrition:

● Nutrition, growth and multiplication of bacteria, common bacterial diseases, use of culture media in diagnostic bacteriology.

Unit3. Sterilization and Disinfection:

● Introduction and importance, principles and use of equipments of sterilization namely hot air oven, autoclave and serum inspissator
● Pasteurization, antiseptic and disinfectants
● Antimicrobial sensitivity test.

Unit4. Immunology:

● Immunity- vaccines, types of vaccine and immunization schedule
● Principles and interpretation of commonly done serological tests like Widal, VDRL, ASLO, CRP, RF & ELISA
● Rapid tests for HIV and HbSAg

Unit5. Systematic Bacteriology:

● Morphology, cultivation, diseases caused by bacteria, laboratory diagnosis including specimen collection of Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, E. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochaetes.

Unit6. Parasitology:

● Morphology, life cycle, laboratory diagnosis of E. histolytica, Plasmodium Vivax, Bucheria bancrofti, tape worms and intestinal nematodes.

Unit7. Mycology:

● Morphology, diseases caused and lab diagnosis of fungi like candida, cryptococcus, dermatophytes etc., opportunistic fungi

Unit8. Virology:

● General properties of viruses, diseases caused, lab diagnosis and prevention of following viruses: Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.

Unit9. Nosocomial Infection:

● Causative agents, transmission methods, investigation, prevention and control of Nosocomial/Hospital infection, principles and practice, biomedical waste management.

Unit10. Clinical Pathology

● Introduction to clinical pathology, collection, transport, preservation and processing of various clinical specimens,
● Urine Examination- collection and preservation of urine, physical, chemical, microscopic

examination

- Examination of body fluids-examination of cerebrospinal fluid (CSF)
- Sputum Examination
- Examination of faeces

PRACTICAL COMPONENT

- Urine Examination: Physical, Chemical, Microscopic
- Blood Grouping, Rh typing
- Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation Rate (ESR)
- Bleeding Time, Clotting Time
- Histopathology – Section Cutting and H &E Staining
- Compound Microscope
- Demonstration and sterilization of equipments – Hot Air oven, Autoclave, Bacterial filters
- Demonstration of commonly used culture media: Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Mac-conkey medium, LJ media, Robertson Cooked meat media, Potassium telluride, media with growth, Mac with LF & NLF, NA with staph
- Antibiotic susceptibility test
- Demonstration of common serological tests – Widal, VRDL, ELISA. Grams stain, Acid fast staining
- Stool exam for Helminthes ova
- Visit to hospital for demonstration of bio-medical waste management
- Anaerobic culture methods

BSOP-206- STATISTICS AND OCUPATIONAL OPTOMETRY

Unit1. Introduction to Statistics

- Introduction of collection of data- presentation including classifications and diagrammatic representations
- Frequency distribution
- Measures of central tendency
- Measures of dispersion
- Correlation and regression (linear)
- Probability-simple ideas
- Theoretical distributions – binomial, normal
- Sampling – necessity of methods and techniques
- Chi – square test (2x2)

Unit2. Hospital Statistics

- Introduction to biostatistics, epidemiology
- Measures of morality
- Descriptive epidemiology, Biological variability
- Screening, sampling, statistical significance
- Correlation-retrospective studies
- Prospective studies
- Randomized clinical trials
- Association and causation
- Bias and confounding
- Sample size determination
- Survival analysis

Unit3. Law and Optometry

- Legal environment techniques – History, law and equity, history and theory of licensure
- Licensure as a means of internal and external discipline
- Unprofessional conduct, incompetence-gross immorality
- International optometry - important foreign optometry law
- Malpractice - theory of liability, damages, minimizing malpractice claims, insurances; negligence
- Ethics- Professional ethics, laws governing practice of medical and paramedical profession in India
- Present rules and regulations - laws regarding optical product Manufacturers
- Dispensing in India

Unit4. Industrial Eye Problems and the Ophthalmologist

- Analysis of the workplace vision requirements
- Visual requirements of jobs, visual ergonomics of the office workplace, ergonomic tactics to prevent visual fatigue and other visual disorders
- Contact lenses in the workplace

Unit5. Occupational Diseases

- Introduction to ocular diseases caused by physical agents, chemical agents and biological agents
- Prevention of Occupational diseases

Unit6. Toxicology of Metals and Chemical

- Effects and injuries especially on the eye and visual system
- Pesticides- general and ocular effects
- Dermatitis and heat stress

Unit7. Aspects of Vision Loss

- Anatomical and structural changes
- Visual functions, functional vision, societal and economic consequences, impairment versus disability evaluations

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- A. Altman, D.G. (1991), Practical Statistics for Medical Research, Chapman and Hall, London.
- B. Armitage, P. and Berry, G (1987), Statistical Methods in Medical Research, 2nd Ed. Blackwell, Oxford.
- C. Zenz, "Occupational medicine; principles and practical applications", Year Book, Medical Publishes, 1975

THIRD YEAR

BSOP-301-CLINICAL & INVESTIGATIVE OPTOMETRY

Unit1. Sterilization and Disinfection

- Definition, introduction & importance
- Various methods of disinfection and sterilization
- Sterilization of Instruments

Unit2. Anesthetic Agents & Their Indications

- Introduction, need, effects, patient preparation
- Pre-operative, per-operative & post-operative care of anesthetic patient
- Various types of anesthesia and their effects
- General anesthesia techniques
- Local anesthesia techniques
- Monitoring in the Operation Theatre
- Positioning of Patient
- Instrument planning for various surgical procedures

Unit2. Apilation & Electroapilation

Unit3. Corneal Scraping

Unit4. Cauterisation of ulcers

Unit5. Conjunctival Swabs for Culture & Sensitivity

Unit6. Tonometry

Unit7. Fluorescence staining

Unit8. FFA

Unit9. Lacrimal Syringing

Unit10. Keratometry

Unit11. Biometry

Unit12. Color Vision

Unit13. Lensometry

Unit14. Perimetry

Unit15. Pachometry

Unit16. Gonioscopy

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

**PRACTICAL COMPONENT:
CLINICAL & INVESTIGATIVE OPTOMETRY (BSOP-305P)**

1. Techniques of disinfection
2. Application of tonometry, biometry, lensometry, keratometry
3. Application of gonioscope
4. Application of pachometry

BSOP-302-ADVANCED CONTACT LENSES AND LOW VISUAL AIDS

Unit1. Contact Lenses

- Definition & history
- Nomenclature of contact lenses
- Types of contact lenses
- Lens Materials-Monomers, Polymers
- Physical, physiological and optical properties of contact lens material
- Parameters of the materials used for contact lenses
- Glass, Plastic, Polycarbonate Lens surfacing
- Ophthalmic Lens Coating, Absorptive Lenses, Impact Resistant Lenses
- Indications & Contraindications
- Lenses for the Aphakic patient
- Aspheric lenses
- Inspection of lens quality
- Complications of contact lenses
- Artificial tear

Unit2. Pre-fitting assessment for contact lenses

- Steps, significance, recording of results
- Correction of Astigmatism with RGP lens
- Types of fitting- Steep, flat, optimum on spherical cornea with spherical lenses
- Types of fitting – Steep, Flat, Optimum on Toric cornea with spherical lenses
- Disposable lenses- advantages and availability
- Calculation and finalizing
- Contact lens parameters
- Fitting of contact lenses
- Contact lens solution

Unit3. Common Handling Instructions

- Insertion & Removal Techniques
- Do's and Don't's
- Care and Maintenance of Rigid lenses
- Cleaning agents & Importance
- Rinsing agents & Importance
- Disinfecting agents & importance
- Lubricating & Enzymatic cleaners

Unit4. Soft Toric Contact Lenses

- Stabilization techniques
- Parameters election
- Fitting assessment
- Common Handling Instructions
- Insertion & Removal Techniques
- Do's and Don'ts; Care and Maintenance of Soft lenses
- Cleaning agents & Importance
- Rinsing agents & Importance
- Disinfecting agents & importance
- Lubricating & Enzymatic cleaners
- Complications of Soft lenses
- Therapeutic contact lenses- Indications, fitting consideration

Unit5 Adjunct Examinations

- Ophthalmic Case Historian
- Visual Acuity
- Contrast Sensitivity and Glare Testing
- Color Vision
- Ocular Motility
- Physical Examination- Anterior Segment Evaluation & Posterior Segment Evaluation

Unit6. Analysis and Prescription of Optical Corrections

- Analysis, Interpretation and Prescription for the Ametropias and Heterophorias
- Correction with Single Vision
- Correction with Multifocal Spectacle Lenses
- Prescription of Absorptive Lenses
- Applied Optics of Contact Lens Correction

Unit7. Special Conditions

- Cases of Infants, Toddlers, and Children
- Patients with Amblyopia and Strabismus
- Patients with Anisometropia and Aniseikonia
- Patients with High Refractive Error
- Patients with Irregular Corneal Astigmatism
- Case of The Elderly-Patients with low vision & patients with ocular pathology

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- Khurana, Theory and Practice of Optics and Refraction.
- W.A. Douthwaite, Contact Lens Optics and Lens Design, Elsevier
- Kamina C: A study of corneal endothelial response to contact lenses. Contact Lens

PRACTICAL COMPONENT

ADVANCED CONTACT LENSES AND LOW VISUAL AIDS (BSOP-306(P))

- Recording Visual Acuity.
- Streak retinoscopy.
- Subjective refraction.
- Measurement of amplitude of accommodation.
- Soft contact lens insertion and removal.
- RGP contact lens insertion and removal.
- Fitting assessment of soft spherical contact lens.
- Fitting assessment of soft toric contact lens.
- Fitting assessment of RGP contact lens.

BSOP-303-COMMUNITY OPTOMETRY AND EYE BANKING

Unit1. Community Optometry

- Introduction, history, basic concepts
- Global medicine and evolution of public health in India
- Health care delivery systems in India in terms of Optometry
- Determinants of ophthalmic health
- Levels of prevention
- Role of optometrist in Community

Unit2. Eye Care Programme

- School Eye screening programme
- Primary eye care; organization of out-reach services and reach-in programmes
- Rehabilitation of the visually impaired
- National programme for the control of Blindness (NPCB)
- Nutritional blindness with reference to vitamin A deficiency

Unit3. Eye Diseases and Care

- Epidemiology of blindness-cataract, glaucoma, deficiency disorders
- Scope of geriatric ophthalmology in preventive and rehabilitation care
- Natural history of disease; transmission of disease
- Basics in research methodology in populations

Unit4. Health Services

- Principles of primary, secondary and tertiary care
- Planning of health services
- Health manpower planning and development
- Basics of Ophthalmic O.T Practices
- Orientation to use of Operating Microscope.

Unit5. Eye Problems

- Role of an optometrist in Public Health
- Ocular emergencies- Foreign body insertion, eye pain
- Watering
- Injuries-perforating, non-perforating & chemical

Unit6. Public Relation in Action

- Organization and management of eye care programs
- Service delivery models
- Contrasting between clinical and community health programmes; Optometrist role in school eye health programmes; Basis of Tele Optometry and its application in public health

Unit7. Eye Banking

- Publicity, prerequisites of eye donation, how to donate your eyes
- Collection of donor eyes
- Preservation of eyes
- General concepts about corneal transplantation

Unit8. Facilities, Equipment & Maintenance of Eye Banking

- Facilities and infrastructure requirement for eye banking
- Eye bank maintenance
- Equipment maintenance and cleaning
- Instruments and reagents
- Infection control and safety

- Waste disposal
- Donor Tissue Preservation Standards- In Situ and Laboratory removal of Corneo-scleral Rim
- Short Term Preservation, Long Term Preservation, Whole Globe Preservation, Sclera Preservation
- Donor Blood Screening
- HIV Screening, Hepatitis B & C Screening, HTLV-I and HTLV-II Screening
- Non-required laboratory results
- Quality assurance
- Quality control
- Non- surgical donor tissue
- Storage
- Labeling
- Distribution of tissue

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- A. Newcomb. D. Robert, Jolley. L. Jerry, “Public Health and Community Optometry”, Thomas, 1980
- B. Yih Yuehwern, “Handbook of Healthcare Delivery Systems”, CRC Press Copyright.
- C. Kishore Jugal, “National Health Programs of India: National Policies & Legislations Related to Health”, Century Publications, 2005

COMMUNITY OPTOMETRY AND EYE BANKING (BSOP-307P)

1. Eye Screening
2. Diseases of Eye-Diagnosis, precautions and treatment to the patient
3. Preparing Ophthalmic OT
4. Eye banking-Collection and preservation of donor eyes
5. Techniques of disposal of waste

BSOP-304-GERIATRIC AND PEDIATRIC OPTOMETRY

Unit1. History

- Genetic factors
- Prenatal factors
- Perinatal factors
- Postnatal factors
- Measurement of visual acuity.

Unit2. Basics of ocular anatomy & Ocular Pathology

- Orbit; Eyelids
- Lacrimal system
- Conjunctiva
- Cornea
- Sclera
- Anterior chamber
- Uveal tract
- Pupils
- Lens
- Vitreous
- Funds
- Oculomotor system

Unit3. Measurement and Determination

- Refractive status
- Determining binocular status
- Determining sensory and motor adaptability.

Unit4. Compensatory Treatment and Remedial Therapy

- Myopia, Pseudo myopia, Hyperopia
- Astigmatism and Anisometropia
- Strabismus
- Amblyopia
- Nystagmus

Unit5. Anomalies of Vergence and Accommodation

- Anomalies of Vergence.
- Anomalies of Accommodation;

Unit6. Geriatric Optometry

- Physiological changes in the eye
- Optical and refractive changes in the eye.

Unit7. Structural Changes in the Eye and Old Eye Disorders

- Aphakia- Ocular diseases common in old eye with special reference to cataract disorders
- Vascular diseases and degenerative conditions of the eye.

Unit8. Ophthalmic Dispensing and Geriatric Care

- Management of visual problems of aging
- Overcoming common ophthalmic problems in geriatric patients

Unit9. Visual Disorder and Management

- Visual Disorders in senior citizens
- evaluation; diagnosis and management.

LEARNING SOURCE: Reference Books, Lecture Notes and Demonstration

ADDITIONAL READINGS:

- A. Agarwal, R., Integrating Theory with practice, Optician, Volume 236, 2008.
- B. Carlson, N, Kurtz, D, Heath, D, Hines, C. Clinical Procedures for Ocular Examination. Appleton & Lange: Norwalk, 1990.
- C. Ali, Mohamed Ather; Klyne, Vision in Vertebrates: New York: Plenum Press.

Practical Component

GERIATRIC AND PEDIATRIC OPTOMETRY (BSOP-308P)

- 1 Syringing of lacrimal passage.
- 2 Assessment of corneal sensitivity.
- 3 Assessment of pupil.
- 4 Ocular motility test.
- 5 Hirschberg corneal reflex test.
- 6 Cover test.
- 7 Measurement of tear volume.
- 8 Determination of tear film break-up time.
- 9 Measurement of tear prism height.