

Syllabus
For
Bachelor of Optometry (BOptom)
Academic Programme

Duration: 4 years (including 1 year internship)

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UPUMS, Saifai

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29/02/24
NCC, Government
Faculty of Paramedical Sciences
UPUMS, Saifai

Dean
Faculty of Paramedical Sciences
UPUMS, Saifai

B.Optometry (Syllabus)

DURATION OF COURSE:

- B.Optom course is a full time course.
- Duration will be four years (including compulsory one year rotatory internship).
- This course shall be divided into three professional examinations namely BOPT Part-I at the end of first academic year, BOPT Part-II at the end of second academic year & BOPT Part-III at the end of third academic year.

EXAMINATION:

- There shall be an annual university examination at the end of each academic year in the form of theory papers and practical examinations. The candidate shall be required to appear in every subject as specified in the course structure for each year.

DURATION OF EXAMINATION:

- o Each theory paper shall be of 3 hrs. duration.

SCHEME OF EXAMINATION:

BOPT-Part-I(First Year) University Examination

S. No.	Subjects	Subject code	THEORY MARKS				PRACTICAL MARKS				Total Marks
			Theory Paper	Internal Assessment	Total	Minimum Marks	Practical	Internal Assessment	Total	Minimum Marks	
1	General Anatomy & Ocular Anatomy	BOPT-101	80	20	100	50	80	20	100	50	200
2	General Physiology & Ocular Physiology	BOPT-102	80	20	100	50	80	20	100	50	200
3	General Biochemistry & Ocular Biochemistry	BOPT-103	80	20	100	50	80	20	100	50	200
4	Physical Optics	BOPT-104	80	20	100	50	80	20	100	50	200
5	Geometric Optics	BOPT-105	80	20	100	50	80	20	100	50	200
Grand Total										1000	

BOPT-Part-II(Second Year) University Examination

S: No	Subjects	Subject Code	THEORY MARKS				PRACTICAL MARKS				Total Marks
			Theory Paper	Internal Assessment	Total	Minimum Marks	Practical	Internal Assessment	Total	Minimum Marks	
1	Optometric Optics	BOPT-201	80	20	100	50	80	20	100	50	200
2	Visual Optics	BOPT-202	80	20	100	50	80	20	100	50	200
3	Optometric Instruments & Clinical Examination of Visual System	BOPT-203	80	20	100	50	80	20	100	50	200
4	General Pathology & General Microbiology	BOPT-204	80	20	100	50	80	20	100	50	200
5	Biostatistics, Epidemiology & Occupational Optometry	BOPT-205	80	20	100	50	-	-	-	-	100
6	General Pharmacology & Ocular Pharmacology	BOPT-206	80	20	100	50	-	-	-	-	100
7	Clinical Work	BOPT-207	-	-	-	-	-	-	100	50	100
Grand Total										1100	

BOPT-Part-III(ThirdYear)UniversityExamination

S: no	Subjects	Subject code	THEORYMARKS				PRACTICALMARKS				Total Marks
			Theory Paper	InternalAssessment	Total	Minimum Marks	Practical	InternalAssessment	Total	Minimum Marks	
1	Squint&BinocularVision	BOPT-301	80	20	100	50	80	20	100	50	200
2	ContactLens	BOPT-302	80	20	100	50	80	20	100	50	200
3	OcularDiseases	BOPT-303	80	20	100	50	80	20	100	50	200
4	LowVisionAids	BOPT-304	80	20	100	50	80	20	100	50	200
5	Geriatric&Pediatric Optometry	BOPT-305	80	20	100	50	80	20	100	50	200
6	ClinicalWork	BOPT-306	-	-	-	-	-	-	100	50	100
GrandTotal										1000	

INTERNALASSESSMENT

- Itwill befortheoryandpractical both.
- Itwillbedonethroughthewholeyear.
- Candidate must obtain at least 35% marks in theory and practicals separately in internal assessment to be eligible for the annual university examination.

- Internalassessment(Theory)willbedoneasfollows:

- | | |
|---------------------------------------------------------|-----------------|
| a) Mid-termandtermexaminations | =10 marks |
| b) Assignments/Projects/Classtest/ClinicalPresentations | =05 marks |
| c) Attendance | =05 marks |
| Total | =20marks |

Internalassessment(Practical)will bedoneasfollows:

- | | |
|------------------------|------------------|
| a) Laboratorymanual | =10 marks |
| b) Daytodayperformance | =05 marks |
| c) Attendance | =05 marks |
| Total | = 20marks |

Internalassessmentofsubjects withoutpracticalwill bedone as:

- | | |
|---------------------------------------------------------|-----------------|
| a) Mid-termandtermexaminations | =10 marks |
| b) Assignments/Projects/Classtest/ClinicalPresentations | =05 marks |
| c) Attendance | =05 marks |
| Total | =20marks |

CRITERIA FOR PASSING

- A candidate is declared to have passed University examination in a subject, if he/she secures 50% of the marks in theory and 50% in practical separately. For computation of 50% marks in theory, the marks scored in the internal assessment (theory) shall be added to the University conducted written examination and for passing in practical the marks scored in University conducted practical examination and internal assessment (practical) shall be added together.

GRACE MARKS:

- If a candidate fails in one subject (theory only) in the annual University examination, five grace marks will be given to the candidate by the University before the declaration of result.
- Candidate failing in practical examination will be considered as failed.

SUPPLEMENTARY EXAMINATION:

- A candidate failing in a subject but securing at least 30% aggregate marks will be required to appear in the university examination after 3 months in that subject/ subjects while attending classes of next year. Those who secure less than 30% aggregate marks will be required to appear in all the subjects.
- If the candidate fails in supplementary examination his/her session will be shifted by one year. The candidate will have to take admission in the previous year and pay the tuition fee for the academic year. He/she will have to appear in all the subjects in the examination.
- Supplementary examination will be held not earlier than 3 months and later than 6 months from the date of annual University examination.

DIVISION:

- Candidate will be awarded division at the end of fourth academic year as follows:
 - Distinction - 75% and above marks in any subject.
 - First division - 60% and above in the aggregate of marks of all subjects.
 - Second division - 50% or more but less than 60% in the aggregate of marks of all subjects.

DEGREE:

- The degree of B.Optom course of the University shall be conferred on the candidates who have pursued the prescribed course of study for not less than four academic years and have passed examinations as prescribed under the relevant scheme and completed one year of compulsory rotatory internship.

SYLLABUS

Course of study

BOPT-I Year

S:no	Subjects	Teachinghours		
		Theory	Practicals	Total
1	GeneralAnatomy&OcularAnatomy	80	50	130
2	GeneralPhysiology&OcularPhysiology	70	50	120
3	GeneralBiochemistry&OcularBiochemistry	80	50	130
4	PhysicalOptics	60	60	120
5	GeometricOptics	60	60	120
6*	Computer	30	30	60
7*	English	40	-	40

*Notincluded foruniversityexamination

BOPT-II Year

S:No	Subjects	Teachinghours		
		Theory	Practical	Total
1	OptometricOptics	60	60	120
2	VisualOptics	60	70	130
3	OptometricInstruments&ClinicalExaminationof Visual System	60	70	130
4	GeneralPathology&General Microbiology	70	60	130
5	Biostatistics,Epidemiology&Occupational Optometry	70	-	70
5	GeneralPharmacology&OcularPharmacology	60	-	60
6*	ClinicalWork	-	80	80

*Notincluded foruniversityexamination

BOPT-IIIYear

S:no	Subjects	Teachinghours		
		Theory	Practical	Total
1	Squint&BinocularVision	50	60	110
2	Contact Lens	50	70	120
3	OcularDiseases	80	60	140
4	LowVisionAids	50	50	100
5	Geriatric&PediaticOptometry	50	50	100
6	ClinicalWork	-	80	80

*Notincluded foruniversityexamination

SYLLABUS

Course of study

BOPT-I Year

S:no	Subjects	Teachinghours		
		Theory	Practicals	Total
1	GeneralAnatomy&OcularAnatomy	80	50	130
2	GeneralPhysiology&OcularPhysiology	70	50	120
3	GeneralBiochemistry&OcularBiochemistry	80	50	130
4	PhysicalOptics	60	60	120
5	GeometricOptics	60	60	120
6*	Computer	30	30	60
7*	English	40	-	40

*Notincluded foruniversityexamination

BOPT-II Year

S:No	Subjects	Teachinghours		
		Theory	Practical	Total
1	OptometricOptics	60	60	120
2	VisualOptics	60	70	130
3	OptometricInstruments&ClinicalExaminationof Visual System	60	70	130
4	GeneralPathology&General Microbiology	70	60	130
5	Biostatistics,Epidemiology&Occupational Optometry	70	-	70
5	GeneralPharmacology&OcularPharmacology	60	-	60
6*	ClinicalWork	-	80	80

*Notincluded foruniversityexamination

BOPT-IIYear

S:no	Subjects	Teachinghours		
		Theory	Practical	Total
1	Squint&BinocularVision	50	60	110
2	Contact Lens	50	70	120
3	OcularDiseases	80	60	140
4	LowVisonAids	50	50	100
5	Geriatric&PediaticOptometry	50	50	100
6	ClinicalWork	-	80	80

*Notincluded foruniversityexamination

B. Optometry (Syllabus)

Internship:

There shall be one year of Internship after the final year examination for candidates declared to have passed the examination in all the subjects.

During the internship candidates shall have to work full time average 7 hours per day (each working day) for 12 Calendar months.

Each candidate is allowed maximum of 12 holidays during entire Internship Program and in case of any exigencies during which the candidate remains absent for a period more than 12 days, he/she will have to work for the extra days during which the candidate has remained absent.

The Internship should be rotatory and cover sub-specialities of Optometry such as Contact Lenses, Binocular Vision, Low Vision, Dispensing Optics & Community Optometry services.

Based on the attendance and work done during posting the Director/Principal/ head of institution/department shall issue 'Certificate of Satisfactory completion' of training following which the University shall award the Bachelor of Optometry Degree or declare the candidate eligible for the same.

No candidate shall be awarded degree without successfully completing one year internship.

Institution shall have to satisfy themselves that satisfactory infrastructure facilities of Optometry exist in the Institute/Centre/Hospital where the internship training has to be undertaken.

Following parameters/guidelines have been suggested:

- a. It is mandatory for the Institution to have its own Optometry clinic fully furnished with all the necessary equipments as per the curriculum of the Program.
- b. Senior Optometrist with sufficient clinical experience should manage the Optometry departments in the Institutes/ Centres/ Hospitals.

Dean can at his discretion grant NOC to the students to do the Internship at the place of his choice provided the concerned Institute/ Centre/ Hospital fully satisfies the above criteria. For the purpose of granting NOC the candidate shall have to submit to the Department the status of Optometry services available at the place where he intends to do his Internship.

General Anatomy & Ocular Anatomy

Subject code - BOPT - 101

Min. Hrs. - Theory: 80 Hrs. & Practical: 50 Hrs.

THEORY

1. Introduction :
Anatomy and its sub - division, planes of the body, terms in relation of structures, Regional Anatomy, organ system.
2. Tissues of the body (Histology of the body tissues) :
 - Epithelium
 - Connective tissue
 - Bone and cartilage
 - Muscles: Skeletal, Smooth & heart muscle.
 - Blood vessels
 - Neuron, Neuroglia
 - Glands: Exocrine and Endocrine
 - Skin and appendages
 - Lymphoid Tissues
3. Organ Systems: (General plan) :
 - Locomotor system: Bones, muscles, joints.
 - Cardiovascular systems: Heart, Regional blood vessels - arteries, veins.
 - Lymphatic system including Immuno system
 - Digestive system
 - Respiratory system
 - Reproductive system
 - Endocrine system
4. Anatomy of Central Nervous System :
 - Central nervous system spinal and brain stem, cerebellum, cerebrum
5. Ocular Anatomy :
 - Eye - Sclera, cornea, choroid, ciliary body, iris, retina
 - Refractory media - Aqueous humor, anterior chamber, posterior chamber Lens, vitreous body
 - Eyelids, conjunctiva
6. Development of Eye and Adnexa

PRACTICAL

1. Identification and description of all anatomical structures.
2. The learning of Anatomy is by demonstration only through dissected parts, slides, models, charts etc.
3. Practical Demonstration of Orbital structure.
4. Practical Dissection of bull's eye.
5. Demonstration of skeleton - articulated and disarticulated.

General Physiology & Ocular Physiology

Subject code - BOPT - 102

Min. Hrs. - Theory: 70 Hrs. & Practical: 50 Hrs.

THEORY

1. General Physiology :

- Cell structure and organization
- Gene action
- Tissue organization
- Epithelium
- Connective tissue - Collagen fibers, elastic fibers, areolar fibers, cartilage, bone.
- Contractive tissue - striated - skeletal - cardiac - non striated - plain myoepithelial
- General principles of cell physiology
- Electrophysiology of cells
- Physiology of skeletal muscles

2. Physiology of Blood :

- Composition
- Volume measurement and variations
- Plasma proteins - classification and functions
- Red blood cells - development, morphology and measurement, functions and dysfunctions
- White blood cells - development, classifications, morphology, functions and dysfunctions
- Platelets - morphology, development, functions and dysfunctions
- Clotting factors - mechanism, anticoagulants, dysfunctions.
- Blood grouping - classifications, importance in transfusion, Rh factor and incompatibility
- Suspension stability
- Osmotic fragility
- Reticulo endothelial system: - Spleen, lymphatic tissue, Thymus, Bone marrow
- Immune system - Cellular, Humoral, autoimmunes

3. Physiology of various systems:

- General arrangement
- Salivary digestion - functions and regulations
- Gastric digestion - functions and regulations
- Pancreatic digestion - functions and regulations
- Intestinal digestion - functions and regulations
- Liver and Bile
- Absorption
- Motility
- Body fluids - distribution, measurement and exchange.
- Kidney - structure of nephron - mechanism of urine formation
- Urinary bladder and micturition
- Endocrine system: Hormone mechanism - negative feedbacks, tropic action-
 Permissive action - cellular actions, hypothalamic regulation

Pituitary	:	Hormones, actions, regulations
Thyroid	:	Hormones, actions, regulations
Adrenal cortex	:	Hormones, actions, regulations
Adrenal medulla	:	Hormones, actions, regulations
Parathyroid	:	Hormones, actions, regulations

- Islets of pancreas - Hormones, actions, regulations
- Reproduction- Male reproductive system - control and regulation, semen analysis
- Female Reproductive system- Uterus, ovaries, menstrual cycle regulation, Pregnancy and delivery, family planning
- Respiration- Mechanics of respiration- pulmonary function tests, Transport of respiratory gases, neural and chemical regulation of respiration, hypoxia, cyanosis, dyspnoea, asphyxia
- Circulation- General principles, Heart: myocardium, Innervations, transmission of cardiac impulse, events during cardiac cycle, cardiac output
- 4. Physiology of Nervous system :
 - Neuron - conduction of impulse, synapse, receptor. Sensory organization - pathways and perception, Reflexes, cerebral cortex - functions, Thalamus - basal ganglia
 - Cerebellum
 - Hypothalamus
 - Special senses (elementary)
- 5. Ocular Physiology :
 - Protective mechanisms in the eye, Eyelid and lacrimation, description of the globe
 - Extrinsic ocular muscles, their action and control of their movements
 - Coats of the eyeball
 - Cornea
 - Aqueous humour and vitreous
 - Intra ocular pressure
 - Iris and pupil
 - Crystalline lens and accommodation - presbyopia
 - Retina structure & function
 - Vision - general aspects of sensation
 - Pigments of the eye and photo chemistry
 - The visual stimulus, refractive errors
 - Visual acuity
 - Visual perception-binocular vision, stereoscopic vision, optical illusion
 - Visual pathway, central & cerebral connections, lesions of pathways & effects
 - Colour vision and colour vision defects

PRACTICAL

1. Component & setting of the compound microscope
2. focusing of object
3. Use of Low & High Power objective of microscope
4. Measurement of pulse, blood pressure
5. Elicitation of Reflexes & jerks
6. Identifications of blood cell by study of peripheral blood smears

General Biochemistry & Ocular Biochemistry

Subject code - BOPT - 103

Min. Hrs. - Theory: 80 Hrs. & Practical: 50 Hrs.

THEORY

1. Basics of energy metabolism, nutrition & dietetics :
Unit of measuring energy, caloric value of food, BMR & factors affecting it, SDA of food, calculation of energy requirement, balanced diet, nutrition in health & diseases (protein energy malnutrition).

2. **Chemistry of carbohydrates & their related metabolism :**
Introduction, definition, classification, biomedical importance
Brief outline of metabolism :
Glycogenesis & glycogenolysis (In brief), Glycolysis, citric acid cycle & its significance,
HMP shunt & Gluconeogenesis (In brief), regulation of blood glucose level.
3. **Amino acids :**
Definition, classification, essential & non essential amino acids.
4. **Chemistry of Proteins & their related metabolism :**
Introduction, definition, classification, biomedical importance
Metabolism :
Transamination, Decarboxylation, Ammonia formation & transport, Urea cycle.
5. **Chemistry of Lipids & their related metabolism :**
Introduction, definition, classification, biomedical importance, essential fatty acids,
Brief outline of metabolism :
Beta oxidation of fatty acids, Ketosis, Cholesterol & its clinical significance,
Lipoproteins in the blood composition & their functions in brief, Atherosclerosis.
6. **Enzymes :**
Introduction, definition, classification, coenzymes, isoenzymes, properties, factors
affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes -
Creatinine kinase, Alkaline phosphatase, Acid phosphatase, LDH, SGOT, SGPT,
Amylase, Lipase, Carbonic anhydrase etc.
7. **Acid base balance concepts & disorders:**
pH, Buffers, Acidosis, Alkalosis
8. **Vitamins :**
Water & fat soluble vitamins, sources, requirement, deficiency disorders & biochemical
functions & deficiency disorders
9. **Hyperglycemia & hypoglycemia :**
Diabetes mellitus - definition, types, features, gestation diabetes mellitus, glucose
tolerance test, glycosuria
Hypoglycemia & its causes
10. **Minerals :**
General functions and sources, Macro and micro minerals associated with the eye,
Deficiencies and excess ophthalmic complications, Example: Iron, calcium, Iodine etc.
11. **Free radicals :**
Biological reactions, oxidants, antioxidants, diseases, Therapeutic uses of antioxidants
12. **Biochemistry of anterior segment of eye :**
 - Importance of ocular biochemistry in clinical optometric practice.
 - Tear film - composition, lipid layer, aqueous layer, mucoid layer, functions,
dysfunctions, diagnostic tests, tear substitutes, recent development.
 - Cornea - biochemical composition of epithelium, bowman's layer, stroma, descemet's
layer, endothelium - functions, corneal metabolism, nutrient uptake energy,
transparency, barrier mechanism, pump action, irrigating solutions, aging and other
anomalies, recent developments.
 - Lens - composition, metabolism, glucose utilization, sorbitol pathways, glutathione
and ascorbic acid transport, transparency, cataract formation, aging, photooxidation,
sugar cataract, cataract and ascorbic acid medical therapy - recent developments.
 - Aqueous humour - composition - function - ciliary body - aqueous humour
production - IOP - Glaucoma.

13. Biochemistry of posterior segment of eye :

- Vitreous humour - structure, composition, functions, vitreous biochemical pathology, intraocular gels, recent developments.
- Retina - Pigment epithelium structure, composition, photoreceptor cells - rhodopsin, lipids renewal, inner segment
- Pigment epithelium - choroid, metabolism and function, phagocytosis, vitamin A-retinal function and metabolism.
- Retinal neurochemistry: Monoamines - acetyl choline - gaba - amino acids - taurine - neuropeptides, Biochemical correlates of retinal diseases.

PRACTICAL

1. Identification of carbohydrates (Qualitative Tests)
2. Identification of proteins (Qualitative Tests)
3. Estimation of glucose in urine by Benedict's method.
4. Urine analysis - normal & abnormal constituents of urine.
5. Blood glucose estimation.
6. Instruments used in clinical biochemistry lab, their care & maintenance.

Physical Optics

Subject code - BOPT - 104

Min. Hrs. - Theory: 60 Hrs. & Practical: 60 Hrs.

THEORY

1. Nature of light:

- Wave nature of Light - Short coming of wave theory
- Quantum Theory - Dual nature of Light
- Mathematical Representation of Wave - S.H.M. - energy composition of S.H.M. in a straight line and right angles
- Huyge's principle - Laws of reflection and refraction at spherical surfaces and lenses.
- Description of the phenomena of interference, Young's experiment, coherent sources, phase and path difference, intensity, Theory of interference fringes.
- Interference in thin films - Interference due to reflected and transmitted light - Lloyd's single mirror
- Colours of thin films - wedge shaped thin films - testing of planeness of surface
- Newton's rings experiment - refractive index of liquid
- Non-reflecting films
- Visibility of fringes - contrast and contrast threshold.

2. Radiometry & Photometry:

- Radiant intensity
- Irradiance
- Lambert's cosine Law
- Basic concepts and definitions in Photometry
- Reflection co-efficient, transmission co-efficient, power-transmitted and reflected
- Luxman Brodhuu Photometer

3. Diffraction and scattering:

- Single slit, qualitative and quantitative
- Circular aperture
- Double slit pattern and Kirchoff's integral
- Multiple slits - grating
- Reflection grating and the zone plate

- Rayleigh's scattering
- Raman scattering
- 4. Polarisation:
 - Polarisation of transverse waves - light as transverse waves
 - Double refraction, principal plane, Nicol prism - plane polarization
 - Circular elliptic polarization production, detection and behavior
 - Optical activity - Fresnel's half shade polarimeter
 - Polarisation by selective absorption - dichroism
- 5. Spectrum:
 - Sources of spectrum: Bunsen - carbon - mercury - sodium
 - Emission and absorption spectra - classification, visible, ultra violet and infra spectra, electromagnetic spectrum.

PRACTICAL

1. Refractive index of prism for sodium D-line using spectrometer.
2. Dispersive power of prism for Hg source using spectrometer.
3. Air wedge - Interference method to find diameter of an optically thin wire.
4. Newton's ring - to find λ of sodium light.
5. Biprism - To find λ of sodium light.
6. Diffraction grating - (Minimum deviation method) of Hg prominent lines.
7. Polarimeter - specific rotation of dextrose and concentration of IV infection.
8. Luminous Flux Photometer - Comparison of luminous power.
9. μ of liquid - using liquid prism - spectrometer.
10. Michelson interferometer - wavelength of laser light.

Geometric Optics

Subject code - BOPT - 105

Min. Hrs. - Theory: 60 Hrs. & Practical: 60 Hrs.

THEORY

1. Properties of Light, Refraction through spherical surfaces:
 - Rectilinear propagation, reflection, refraction, ray, beam
 - Umbra, penumbra, pinhole camera
 - Introduction: Lens shapes, Vergence and conversion factors, divergence and convergence of wave fronts by spherical surfaces, definition of dioptr, Working of spherical lenses, primary and secondary focal points, predictable rays
 - Prism diopter, Prentice's Law, Deviations, Ophthalmic prisms - thin and thick
 - Spherical refracting interfaces - convex/concave, derivation of vergence equation, sagitta, dioptric power - focal points, nodal points and plane, Symmetry points, imaging examples, lateral magnification
 - Thin lens equation - lenses in contact separated, Two lens systems, reduced system, vergence effectively equation
 - Application - calculation of image points, dioptric powers in reduced systems using vergence techniques.

- Thick lenses - front and back vertex powers, reduced system, dioptric power of equivalent lenses, cardinal points. Application - to calculate to the equivalent dioptric power of thick meniscus lens, plano convex vertex powers, position of principal planes. Dioptric powers using reduced systems. Matrix theory and lens matrices.
 - Cylindrical and spherocylindrical lenses: principle meridians, refraction by a cylindrical lens, calculation of power in different meridians, spherocylindrical lenses, circle of least confusion, interval of Sturm, refraction through a spherocylindrical lens, writing Rx in different forms (cyl, meridional), additional spherocylinders, oblique cylinders.
2. Stops and Pupils:
- Aperture stop.
 - Entrance pupil and exit pupil.
 - Field stop.
 - Entrance port and exit port, field of view, vignetting.
 - Depth of field and depth of focus.
3. Aberrations & Optical Systems:
- Dispersion by a prism - angular dispersion, dispersive power, Dispersion without deviation and deviation without dispersion, Achromatic prisms.
 - Chromatic aberrations - cause and methods of minimizing, achromatic doublets.
 - Monochromatic aberrations - first order and third order theory.
 - Spherical aberrations, coma, astigmatism, curvature, distortion - cause and the methods of minimizing aberrations.
 - Tangent condition for elimination of distortion.
 - Point spread function.
 - Modulation transfer function.
 - Fourier imaging theory.
4. Optical Instruments:
- Spectrometer.
 - Simple and compound microscope.
 - Telescope.
 - Magnifying power of simple and compound microscope, telescope.
 - Resolving power of optical instruments.
 - Resolving power of the eye.
 - Fiber Optics.
 - Laser Optics: Basic laser principles - spontaneous and stimulated emission, Coherence - spatial, temporal, Laser pumping - population inversion optical feedback, Gas lasers, and solid lasers, Helium neon laser - argon - ion laser - ruby laser, Monocular laser - carbondioxide, excimer laser, Semi conductor lasers, Lasers in medicine ophthalmic applications.
 - Lens shape, vergences and conversion factors, divergent and convergence of wave fronts by spherical lens.
5. Principles of Lighting :
- Modern theory on light & colour: synthesis of light.
 - Additive and subtractive synthesis of colour.
 - Visual task: Factors affecting visual tasks.
 - Light & vision: Discomfort glare, visual ability, relationship among Lighting, visibility and task performance.

- Light sources: Modern light sources, spectral energy distribution, luminous efficiency, colour temperature, colour rendering.
- Illumination: Luminous flux, candle, solid angle, illumination, Utilization factor, depreciation factor, illumination laws.
- Lighting system Design: Design approach, Design Process, Concept of Lighting design, physical consideration and psychological consideration and types of lighting.
- Photometry: Measurements of illumination, photometers and filters.

PRACTICAL

1. f & μ of convex lens (f by $u-v$ and shift method)
2. f & μ of concave lens (f of concave lens by $u-v$ method, combined lens $u-v$ method, R - Boy's method).
3. μ of the prism ($I-d$ curve).
4. μ of slab - shift method (traveling microscope)
5. μ of liquid - shift method (traveling microscope)
6. f of convex mirror.
7. f of concave mirror ($u-v$ graph).
8. Verification of laws of reflection - plane mirror.
9. Verification of laws of refraction - glass slab - pin method (μ by lateral shift).
10. Resolving power of telescope.
11. Photocells - characteristics.
12. Plane fluorescent.

English

(Not for University Examination)

Min. Hrs. - Theory : 40 Hrs.

1. Introduction:
Study techniques, Organisation of effective note taking and logical processes of analysis and synthesis, the use of the dictionary, enlargement of vocabulary & effective diction.
2. Applied Grammar:
Correct usage, the structure of sentences, the structure of paragraphs.
3. Written Composition:
Precise writing and summarising, writing of bibliography, enlargement of vocabulary.
4. Reading and comprehension
Review of selected materials and express oneself in one's words, enlargement of vocabulary.
5. The study of various forms of composition paragraph, essay, letter, summary, practice in writing.
6. Verbal communication:
Discussions and summarization, debates, oral reports, use in teaching.

Computer

(Not for University Examination)

Min. Hrs - Theory : 30 Hrs., Practical : 30 Hrs.

Course Contents:

1. Input and Output units:

Their functional characteristics, main memory, cache memory, read only memory, overview of storage devices - floppy disk, hard disk, compact disk, tape. Computer Networks and Communication: Network types, network topologies.

2. Internet:

Evolution, Protocols, Interface Concepts, Internet Vs Intranet, Growth of Internet, ISP, SSS Connectivity - Dial-up, Leased line, VSAT etc, URLs, Domain names, Portals, E-MAIL - Concepts, POP and WEB based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E-mail services.

3. Electronic Payment Systems:

Introduction, Types of Electronic payment systems, Digital Token Based, Electronic payment systems, Smart Card and Electronic payment systems, Credit Card Based Electronic payment systems, Risk and Electronic payment systems.

4. Html:

Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting text, Images, Hyperlinks, Backgrounds and Color Controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes, List types and its tags, Use of Frames and Forms in web pages. Overview of MS Front Page, Macromedia Dream weaver, and other popular HTML editors, designing web sites using MS Front Page (using at least Front Page 2000)

Optometric Optics

Subject code - BOPT - 201

Min. Hrs. - Theory : 60 Hrs. & Practical: 60 Hrs.

THEORY

1. Spectacle Lenses :

- Introduction to spectacle lenses.
- Forms of lenses.
- Cylindrical and spherocylindrical lenses.
- Properties of crossed cylinders.
- Toric lenses, toric transposition.
- Astigmatic lenses.
- Axis Direction of astigmatic lenses.
- Obliquely crossed cylinders.
- Sag Formulae.
- Miscellaneous spectacle lenses.
- Vertex distance and vertex power.
- Eye induced power.
- Aberrations in ophthalmic lenses.
- Fresnel prisms, Lenses and Magnifiers.
- Manufacture of glass.
- Lens surfacing.
- Principles of surface generation and glass constants.
- Lens quality.
- Faults in lens material.
- Faults on lens surface.
- Inspecting the quality of lenses.
- Toughened lenses.

2. Ophthalmic Lenses :

- Definition of prisms, Units of prism power.
- Thickness difference and Base apex notations.
- Dividing, Compounding and Resolving prisms.
- Rotary prisms and effective prism power in near vision.
- Prismatic effect, decentration, Prentice Rule.
- Prismatic effect of spherocylinders and Plano cylinders.
- Differential prismatic effects.

3. Tinted and protective lenses :

- Characteristics of tinted lenses.
- Absorptive Glasses.
- Polarising Filters.
- Photochromic Filters.
- Reflecting Filters.
- Bifocal lenses.
- Trifocal lenses.
- Progressive addition lenses.
- Lenticular lenses.

- Reflection from spectacle lenses, ghost images, Reflections in bifocals at the dividing line.
 - Antireflection coating, antiscratch coating, antifog coating, Mirror coating, edge coating, Hard Multi Coating (HMC)
 - Field of view of lenses
 - Size, shape of view of lenses
 - Aspherical lenses
4. Spectacle Frames :
- Types and parts.
 - Classification of spectacle frames-material, weight, temple, position, coloration.
 - Frame construction, frame measurements and markings.
5. Dispensing Optics :
- Surfacing and polishing glass lenses.
 - Glazing.
 - Frame manipulation and repair.
 - Facial measurements and frame choice.
 - Front and dimension measurements of complete pair of spectacles.
 - Complete dispensing for subjects.
 - Special lenses - examination of specimens.
 - Lens faults in sections.
 - Measurements of assorted faces for spectacle.
 - Making and edging of bifocal lenses.
 - Edging of lenses for plastic, metal and rimless frames.
 - Joining plastics by different solvents.

PRACTICAL

Practical work related to:

1. Spectacle lenses
2. Ophthalmic lenses
3. Spectacle frames & dispensing optics.

Visual Optics

Subject Code - BOPT - 202

Min. Hrs. - Theory: 60 Hrs. & Practical: 70 Hrs.

THEORY

1. Review of Geometric Optics :
- Vergence and power.
 - Conjugacy, Object space and image space.
 - Sign convention.
 - Spherical Mirror.
 - Cardinal power.
 - Cardinal points.
 - Magnification.

B. Optometry (Syllabus)

2. Optics of Ocular Structures :
 - Cornea and aqueous.
 - Crystalline lens.
 - Vitreous.
 - Schematic and reduced eye.
 - Corneal curvature and thickness.
 - Keratometry.
 - Curvature of the lens and ophthalmometry.
 - Axial and axis of the eye.
3. Refractive anomalies and their causes :
 - Etiology of refractive anomalies.
 - Contributing variables and their ranges.
 - Population distributions and their ranges.
 - Optical component measurement.
 - Growth of eye in relation to refractive errors.
 - Emmetropia.
 - Myopia.
 - Hyperopia.
 - Astigmatism.
 - Anisometropia and Anisokonia.
 - Presbyopia.
 - Aphakia and pseudophakia.
 - Correction and management of Amblyopia.
4. Far and near points of Accommodation and Vertex Distance :
 - Correction of spherical Anisotopia.
 - Axial versus refractive anisotopia.
 - 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 hbar, Depth of focus and depth of field.
5. Retinoscopy (Principles and Methods) :
 - Retinoscopy-speed of reflex and optimum condition.
 - Retinoscopy-Dynamic and Static.
 - Review of objective refractive method.
 - Cross cylinder method for astigmatism, astigmatic fan test.
 - Difficulties in objective tests and their avoidance.
 - Transposition of lenses.
 - Spherical equivalent.
 - Prescribing prism.
 - Binocular Refraction.

PRACTICAL

PART I

1. Study of Purkinje images I & II, III & IV.
2. Measurements of corneal curvature and corneal thickness.
3. Mathematical models of the eye- Emmetropia, Hyperopia, & Myopia.
4. Conjugate points- demonstration, worked examples.
5. Axial and refractive hyperopia- worked examples.
6. Axial and refractive Myopia- worked examples.

7. Effect of lenses in front of the eye.
8. Effect of prism in front of the eye.
9. Vision through pinhole, slit filters etc.

PART II

1. Photometry.
2. Visual acuity Stereocuity in emmetropia.
3. Myopia and pseudomyopia, Myopia and visual acuity.
4. Hypermetropia determination of smallest error subjectively.
5. Myopic correction-subjective verification-monocular and binocular. Demonstration of astigmatism. Use of slit and keratometry to find principle meridians. Stigmatisa-subjective verification tests.
6. Measurement of accommodation -near and far points and range.
7. Presbyopic correction and methods - accommodative reserve balancing the relative accommodation - cross grid test.
8. Methods of differentiating axial and refractive ametropia.
9. Practice of retinoscopy-Emmetropia.
 - Spherical anisotropia
 - Simple astigmatism
 - Compound myopia and hyperopia
 - Oblique and irregular astigmatism
 - In media opacities
 - In strabismus and eccentric fixation
10. Interpretation of cycloplegic retinoscopic findings.
 - Prescription writing
 - Binocular refraction
 - Vision therapy
 - Photo refraction
 - Exercise for vergence

Optometric instruments & clinical examination of visual system

Subject code - BOPT - 203

Min. Hrs. - Theory: 60 Hrs. & Practical: 70 Hrs.

THEORY

1. Refractive Instruments:
 - Test charts standards, choice of test charts.
 - Trial case lenses-Best form lenses.
 - Retinoscopy head units, optical considerations of refractor units.
 - Trial frame design.
 - Near vision difficulties with units and trial frames.
 - Retinoscope-types available.
 - Adjustments of retinoscopes - special features.
 - Cylinder retinoscopy.
 - Interpretation of objective findings.
 - Interpretation of objective tests-polarising and displacement etc. simultan test.
 - Projection charts.
 - Illumination of the consulting room special instruments.
 - Brightness acuity tester.

- Vision analyzer.
- Video acuity test.
- Pupilometer, Lensometer, lens gauge or clock, Refractionometer, Keratometer and corneal topography.
- 3. Other Instruments :
 - Slit lamp.
 - Tonometer - Principle, uses and types.
 - Ophthalmoscopes and related devices.
- 3. Special Equipments :
 - Fundus camera.
 - Orthoptia instruments.
 - Colour vision testing devices.
 - Fields of vision and screening devices.
 - Ophthalmic ultra sonography - ultrasound/ A scan/ Bscan/ UBM.
 - Electrodiagnostics - ERG/VPG/EOG.
 - Nerve fiber analyzer.
 - Scanning laser devices.

PRACTICAL.

1. Demonstration of various instruments.
2. Clinical examination of the visual system :
 - History of the ophthalmic subject.
 - Ocular symptoms, the past prescriptions its influence.
 - Visual acuity testing - distance and near and colour vision.
 - Examination of muscle balance.
 - Examination of eye lids, conjunctiva & sclera.
 - Examination of cornea, lens.
 - Examination of iris, ciliary body and pupil.
3. Special examinations :
 - Examination of intraocular pressure & examination of angle of anterior chamber.
 - Ophthalmoscopy - (direct and indirect).
 - Examination of fundus.
 - Examination of lacrimal system.
 - Examination of orbit.
 - Macular function test.
 - Visual field charting - (central & periphery).
 - Neuro-ophthalmological examination.

General Pathology & General Microbiology

Subject code - BOPT - 204

Min. Hrs. - Theory: 70 Hrs. & Practical: 60 Hrs.

THEORY

General Pathology:

1. Cell Injury and Cellular Adaptations:

- Normal Cell
- Cell Injury- types of cell injury, etiology of cell injury, morphology of cell injury, cellular swelling (in brief)
- Cell death: types- autolysis, necrosis, apoptosis & gangrene (in brief)
- Cellular adaptations- atrophy, hypertrophy, hyperplasia & dysplasia (in brief)

2. Inflammation :

- Acute Inflammation - vascular event, cellular event, inflammatory cells (in brief)
- Chronic Inflammation - general features, granulomatous inflammation, tuberculosis (in brief)

3. Haemodynamic Disorders :

- Oedema, hypervolemia, congestion, haemorrhage, circulatory disturbances, thrombosis, ischaemia & infarction (in brief)

4. Neoplasia :

- Definition, how does it differ from hyperplasia, difference between benign tumour and malignant tumour (in brief)

5. Healing:

- Definition, different phases of healing, factors influencing wound healing. (in brief)
Ophthalmic wound healing

General Microbiology :

1. General characters and classification of Bacteria -

2. Sterilization and Disinfection :

- Physical agents- Sunlight, Temperature less than 100°C, Temperature at 100°C, steam at atmospheric pressure and steam under pressure, irradiation, filtration.
- Chemical agents- Alcohol, Aldehyde, Dyes, Halogens, Phenols, Ethylene oxide.

3. Staining Methods :

- Simple, Gram staining, Ziehl-Neelsen staining or AFB staining, Negative Impregnation

4. Collection and Transportation of Specimens :

- General Principles, Containers, Refrigeration
- Samples - Urine, Faeces, Sputum, Pus, Body fluids, Swab, Blood;

5. Disposal of Laboratory/Hospital Waste :

- Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal.

6. Parasitology :

- Parasitism, host & vectors etc., classification of parasites, diseases caused by various parasites (in very brief)

7. Mycology :

- Morphology & structure of fungi (in brief), classification of fungi, lab diagnosis of fungal infections, opportunistic fungal infection

8. Virology :

General characters of viruses, classification of viruses, lab diagnosis of viral infections (in brief).

9. Nosocomial Infections (in brief)

10. Common fungal, viral and parasitic infections of the eye

PRACTICAL

General Pathology :

1. Collection of blood and anticoagulants used.
2. Estimation of Hemoglobin, R.B.C., W.B.C., T.L.C., D.L.C., E.S.R. Count.
3. Blood Indices, Blood grouping, Bleeding & Clotting time.

General Microbiology :

1. Preparation of Swabs/ sterile tubes & bottles.
2. Preparation of smear.
3. Staining : Grams & Ziehl-Neelsen.
4. Identification of culture media.
5. Identification of instruments.
6. Identification of common microbes.
7. Culture media used for fungus.

Biostatistics, Epidemiology & Occupational Optometry

Subject code - BOPT - 205

Min. Hrs. - Theory: 70 Hrs.

THEORY

Biostatistics :

1. Introduction: Meaning, definition, characteristics of statistics. Importance of the study of statistics. Branches of statistics. Statistics and health science. Parameters and Estimates. Variables and their types. Measurement scales.
2. Tabulation of Data: Basic principles of graphical representation. Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve.
3. Measures of Central Tendency: Need for measures of central tendency. Definition and calculation of Mean - ungrouped and grouped. Interpretation and calculation of Median - ungrouped and grouped. Meaning and calculation of Mode. Geometric mean & Harmonic mean. Guidelines for the use of various measures of central tendency.
4. Measures of Dispersion: Range, mean deviation, standard deviation & variance.
5. Probability and Standard Distributions: Meaning of probability of standard distribution, the binomial distribution, the normal distribution. Divergence from normality - skewness, kurtosis.

6. Correlation & regression : Significance, correlation coefficient, linear regression & regression equation.
7. Testing of Hypotheses, Level of significance, Degrees of freedom.
8. Chi-square test, test of Goodness of fit & Student t-test.
9. Analysis of variance & covariance; Analysis of variance (ANOVA), what is ANOVA? Basic principle of ANOVA, ANOVA technique, Analysis of Co variance (ANACOVA)
10. Sampling: Definition, Types- simple, random, stratified, cluster and double sampling. Need for sampling - Criteria for good samples, Application of sampling in community. Procedures of sampling and sampling design errors.
11. Time series analysis, Method of determining trend, Utility of time series.

Epidemiology:

- Definition
- Basic Measurements in epidemiology (in brief)
- Incidence & prevalence
- Epidemiological studies (in brief)
- Definition of epidemic, endemic, sporadic, pandemic, exotic, zoonosis, epizootic & epornithic.
- Natural history of disease, Transmission of disease.
- Surveillance

Law and Optometry :

- Legal environment techniques-History - law and equity
- History and theory of licensure
- Licensure as a means of internal and external discipline- unethical conduct, incompetence-gross malpractice
- International optometry- important foreign optometry law
- Optometrist in court
- Malpractice-theory of liability-damages-minimizing malpractice claims
- Insurance
- Negligence
- Ethics-Professional ethics
- Laws governing practice of medical and paramedical profession in India
- Registered councils of India- Medical council, Dental council, & Nursing council
- Present rules and regulations-laws regarding optical product manufacturers dispensing in India
- Opticians - are they registered? Dispensing opticians-rules in UK

12. Public Health and Community Optometry :

- Global medicine and evolution of public health in India
- Public health of optometry-concepts and implementation
- Health care delivery systems in India and determinants of health
- Levels of prevention-optometrist's role in community
- Concepts of national Health Programs
- Screening in population
- Epidemiology of Blindness-Cataract, Glaucoma & deficiency disorders
- Scope of geriatric ophthalmology in preventive and rehabilitative care
- National and international agencies in health plan
- Fundamentals of health economics, health plan
- Quality assessment in health delivery programmes

18. Occupational Optometry :

- Introduction to occupational health, hygiene and safety International bodies like ILO WHO, national bodies like labour institutes, National institutes of occupational health, national safety council etc.

General Pharmacology & Ocular Pharmacology

Subject code - BOPT - 205

Min. Hrs. - Theory: 60 Hrs.

THEORY

1. General Pharmacology :

- Introduction and sources of drugs
- Routes of drug administration
- Pharmacokinetics-special emphasis on ocular pharmacokinetics
- Adverse drug reactions-Special emphasis on ocular toxicity of drugs
- Factors modifying drug action

2. Systemic Pharmacology :

- Autonomic Nervous System :- Introduction, Neurotransmitters, their mechanism of action, Drugs affecting:
 - Pupillary Size and Light Reflex,
 - Intraocular Tension,
 - Accommodation,
- Skeletal Muscle Relaxants
- Cardiovascular System: Antihypertensives and drugs useful in Angina
- Central Nervous System: Alcohol, Sedative, Hypnotics, General anaesthetics, Local anaesthetics, Opioids and non opioids

3. Others :

- Chemotherapy: Introduction, general chemotherapy, Specific chemotherapy - Antifungal, Antiviral, Antitubercular & Antileprotic chemotherapy
- Hormones: Corticosteroids, Antidiabetics
- Blood: Coagulants
- Diuretics

4. Ocular Pharmacology :

- Ocular preparations, formulations and requirements of an ideal agents,
- Ocular pharmacokinetics-Methods of drug administration, Special drug delivery systems,
- Ocular toxicology,

5. Diagnostic and Therapeutic applications of drugs in Ophthalmology :

- Agents used to aid diagnosis,
- Drugs and biological agents used in ocular surgery,
- Anaesthetics used in ophthalmic procedures,
- Drug treatment of glaucoma; accommodative esotropia and ocular myasthenia
- Pharmacotherapy of ocular infections-Bacterial, Viral, Fungal, Chlamydial,
- Drugs used in inflammatory disorders of the eye,
- Drug treatment of degenerative disorders of the eye.

13. Occupational Optometry :

- Introduction to occupational health, hygiene and safety International bodies like ILO WHO, national bodies like Labour Institutes, National Institutes of occupational health, national safety council etc.

General Pharmacology & Ocular Pharmacology

Subject code - HOPT - 205

Min. Hrs. - Theory: 60 Hrs.

THEORY

1. General Pharmacology :

- Introduction and sources of drugs
- Routes of drug administration
- Pharmacokinetics-special emphasis on ocular pharmacokinetics
- Adverse drug reactions-Special emphasis on ocular toxicity of drugs
- Factors modifying drug action

2. Systemic Pharmacology :

- Autonomic Nervous System :- Introduction, Neurotransmitters, their mechanism of action, Drugs affecting:
 - Pupillary Size and Light Reflex
 - Intraocular Tension,
 - Accommodation,
- Skeletal Muscle Relaxants
- Cardiovascular System: Antihypertensives and drugs useful in Angina
- Central Nervous System: Alcohol, Sedative, Hypnotics, General anaesthetics, Local anaesthetics, Opioids and non opioids

3. Others :

- Chemotherapy: Introduction, general chemotherapy, Specific chemotherapy - Antifungal, Antiviral, Antitubercular & Antileprosy chemotherapy
- Hormones: Corticosteroids, Antidiabetics
- Blood: Coagulants
- Diuretics

4. Ocular Pharmacology :

- Ocular preparations, formulations and requirements of an ideal agents.
- Ocular pharmacokinetics-Methods of drug administration, Special drug delivery systems.
- Ocular toxicology.

5. Diagnostic and Therapeutic applications of drugs in Ophthalmology :

- Agents used to aid diagnosis.
- Drugs and biological agents used in ocular surgery.
- Anaesthetics used in ophthalmic procedures.
- Drug treatment of glaucoma, accommodative esotropia and ocular myasthenia
- Pharmacotherapy of ocular infections-Bacterial, Viral, Fungal, Chlamydial.
- Drugs used in inflammatory disorders of the eye.
- Drug treatment of degenerative disorders of the eye.

- Intraocular mediators in ophthalmic practice.
- Use of other agents in ophthalmic practice: Enzymes, Vitamins, Trace elements, Antioxidants, Wetting agents, Tear substitutes.

Clinical work at Hospital
Subject code - BOPT-207
Min. Hrs. - Practical: 90 Hrs.

1. Case sheet
2. History taking
3. Lensometry
4. External examination
5. Test for phorias and tropias
6. Visual acuity
7. Objective Refraction
8. Subjective Refraction
9. Keratometry
10. Slit lamp examination [Applanation tonometry]
11. Drugs and method of application
12. Drops and Ointments - pupillary dilatation
13. Direct ophthalmoscopes
14. Indirect ophthalmoscopes

- The Students of IInd year shall do above the clinical work at Ophthalmology department of the hospital (including OPD & IPD).
- They shall maintain logbooks of patients.
- At the end of academic year their logbooks will be evaluated by the faculty concerned.

Squint & Binocular Vision

Subject code - BOPT - 301

Min. Hrs. - Theory: 50 Hrs. & Practical: 60 Hrs.

THEORY

1. Spatial Sense:
 - Evolution of binocular vision
 - Binocular fusion, suppression, rivalry & summation
 - Visual direction, foveal sign & corresponding points
2. Panum's Space:
 - Stereopsis
 - Development of Binocular vision
 - The longitudinal fovea
 - Neural aspects of binocular vision
 - Visually guided behaviour and misakonia
 - ARC
3. Qualitative & Quantitative diagnosis of Strabismus:
 - Esodeviation
 - Exodeviation
 - A-V Phenomenon
 - Cyclovertical squint
 - Pseudostrabismus
4. Amblyopia and Eccentric fixation:
 - Treatment of amblyopia
 - Special forms of strabismus
5. Nystagmus:
 - Non surgical management of strabismus

PRACTICAL

1. To identify the patients of above problems.
2. History taking & maintaining logbooks
3. Plan of non surgical management of above problems.

Contact Lens

Subject code - BOPT - 302

Min. Hrs. - Theory: 50 Hrs. & Practical: 70 Hrs.

THEORY

1. **History of Contact Lens:**
 - Corneal anatomy and physiology.
 - Corneal physiology and contact lens.
 - Preliminary measurements and investigations.
 - Slit lamp biomicroscopy.
 - Contact Lens Materials.
 - Optics of Contact Lens.
 - Glossary of terms: Contact Lenses.
2. **Indications and Contraindications of Contact Lenses**
 - RGP contact lens design.
 - Soft contact lens design.
 - Keratometry, Placido's disc, Topography.
3. **Fitting Philosophies [Introduction to Contact Lens fitting]:**
 - Handling of CL.
 - Fitting of spherical soft CL and effect of parameter changes.
 - Astigmatism: Correction options.
 - Fitting spherical RGP CL, low DK and high DK.
 - Effects of RGP CL parameter changes on lens fitting.
 - Fitting in astigmatism.
 - Fitting in keratoconus.
 - Fitting in aphakia, pseudophakia.
 - Lens care and hygiene instructions compliance.
 - Follow up post fitting examination.
 - Follow up slit lamp examination.
 - Cosmetic CL.
 - Fitting CL in children.
4. **IC CL:**
 - Bifocal CL.
 - Continuous wear and extended wear CL.
 - Therapeutic CL/Bandage lenses.
 - CL following ocular surgeries.
 - Disposable CL, Frequent replacement lenses.
 - Use of specular microscopy and pachymetry in CL.
 - Care of CL, CL solutions.
 - Complications of CL.
 - CL modification of finished lenses.
 - Instrumentation in CL practice.
 - Checking finished lens parameters.
 - CL special purpose-swimming, sports, occupational etc.

- Recent developments in CL.
 - Review of lenses available in India.
 - Contact CL research
5. Dispensing Optics :
- Curvature and power measurements of typical contact lenses.
 - Edging and polishing curves of contact lenses.
 - Visit to factories making lenses and contact lenses.

PRACTICAL

1. Patient Selection (Type of Contact Lens).
2. Performing Procedure of contact lens fitting :

Procedures for soft Lens :

- Fitting of trial based on the refractive correction & keratometry
- Slit lamp examination to assess the fitting of CL.
- Perform over refraction
- Prescribe the final base curve & power of CL

Procedures for RGP Lens :

- Fitting of trial lens based on the refractive correction & keratometry
- Evaluate the fluorescein pattern under the slit lamp to finalise the base curve of the CL
- Select the trial lens with the final base curve & required power
- Perform over refraction
- Prescribe the final base curve & power of contact lens

Ocular diseases

Subject code - BOPT - 303

Min. Hrs. - Theory: 90 Hrs. & Practical: 60 Hrs.

THEORY

1. Ocular Adnexa :

- Congenital and developmental anomalies of eyelids, Blepharospasm, Entropion and ectropion, Trichiasis and Symblepharon, Eyelid inflammations, Eyelid tumours, Pteris, Eyelid retraction, Eyelid trauma, Methods of lacrimal excision, Congenital and developmental anomalies of lacrimal system, Lacrimal obstructions, Lacrimal sac tumours, Lacrimal trauma, Ectasia and staphylocoma, Scleritis and Epitheliitis, Congenital and developmental anomalies of orbit, Orbital tumours, Orbit inflammations, sinus disorders affecting the orbit, Orbital trauma, specific inflammatory diseases, Tumours of epithelial origin, Glandular and adnexal tumours, Tumours of neuroectodermal origin, Vascular tumours, Xanthomatous lesions, Inflammatory lesions, Metastatic tumours, Degenerations and dystrophies, Definitons, Miscellaneous conditions, Keratoconjunctivitis Sicca, Steven Johnson Syndrome, Ocular Rosacea, Atopic eye disorders, Benign Mucosal Pemphigoid - ocular pemphigoid, Vitamin A deficiency, Metabolic diseases associated with corneal changes.

2. Lens :

- Aging process
- Developmental defects.
- Acquired lenticular defects.
- Management of lenticular defects.

3. Uveal Tract :

- Congenital anomalies.
- Primary and secondary diseases of iris and ciliary body.
- Tumours.
- Anomalies of pupillary functions.
- Congenital anomalies of choroids.
- Diseases of choroids.

4. Vitreous and Retina :

- Developmental abnormalities, Hereditary hyaloidoretinopathies, 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, Bruchs membrane and retinal pigment epithelium, Retinal tumours, Retinoblastoma, Phakomatosis, Retinal vascular anomalies, Retinal and optic nerve head astrocytomas, Other retinal disorders, Retinal inflammations, Metabolic diseases affecting the retina, Miscellaneous disorders, Electromagnetic radiation effects the retina, Retinal physiology and psychophysics, Hereditary macular disorders including albinism, peripheral retinal degenerations, Retinal holes and detachment, Intraocular foreign bodies, Phaco coagulation.

5. Others :

- Neuro ophthalmic examination : History, Visual function testing, Technique of pupillary examination, Ocular motility, Checklist for testing, Visual sensory system, The retina, The optic disc, The optic nerve, Optic chiasma, Optic tracts, Lateral geniculate body, Optic radiations, Visual cortex, Visual field, Blood supply of anterior and posterior visual systems, Disorders of visual integration
- Ocular motor systems: Saccadic system, Clinical disorders of saccadic system, Gaze palsies, Progressive supranuclear palsy, Parkinson's diseases, Ocular motor apraxia, Ocular oscillation, Smooth pursuit system and disorders, Vergence system, Cerebellar system, Nystagmus reflex system, Position maintenance system, Nystagmus, Ocular motor nerves and medial longitudinal fasciculus, The fetal nerve, Pain and sensation from the eye, Autonomic nervous system 32, Selected systemic disorders with neuro ophthalmologic signs.
- An overview of glaucoma: Aqueous humor dynamics - gonioscopy Evaluation of optic nerve head, Visual fields, Glaucoma screening, Classification of glaucoma, Primary open angle glaucoma, Primary angle closure glaucoma, Primary congenital glaucoma, Secondary glaucoma, Principles of medical therapy, Other modalities of glaucoma treatment, Social implications, Rationale in therapy.
- Drug induced ocular diseases, eye and systemic diseases: arterial hypertension, diabetes mellitus, acquired heart diseases - embolism, cancer - introduction, connective tissue diseases, Thyroid disease, tuberculosis, histoplasmosis, common tropical medical ailments, malnutrition, introduction to immunology, neurological disorders, general medical emergencies - first aid, genetics.

PRACTICAL

1. Selection of patients of above diseases
2. History taking & maintaining logbooks
3. Plan of non surgical management of above diseases

Low vision aids

Subject code - BOPT - 304

Min. Hrs. - Theory: 50 Hrs. & Practical: 50 Hrs.

THEORY

1. Identifying the low vision patients:
 - History.
 - Diagnostic procedures in low vision case management.
2. Optics of low vision aids:
 - Refraction, special contact lenses, radical refraction.
 - Evaluating near vision - smaller grid and field defects, prismatic scanning.
 - Demonstrating aids - optical, non optical, electronic.
3. Teaching the patient to use aids including eccentric viewing training where necessary:
 - Spectacle mounted telescopes and microscopes.
 - Guidelines to determine magnification and selecting low vision aids for distance, intermediate and near vision.
4. Children with low vision:
 - Choice of tests, aids in different pathological conditions.
 - Light, glare and contrast in low vision care and rehabilitation.
 - Bionic telescope.
5. Optical devices to help people with field defects:
 - Contact lens combined system.
 - Rehabilitation of the visually handicapped.

PRACTICAL

1. Practical work related to above theory topics
2. Maintaining manual/ logbooks of the practical work.

Geriatric & Pediatric Optometry

Subject Code - BOPT - 305

Min. Hrs. - Theory: 50 Hrs. & Practical: 50 Hrs.

THEORY

Pediatric Optometry:

1. History:

- Genetic factors, Prenatal factors, Perinatal factors
 - Postnatal factors, Measurement of visual acuity, normal appearance, pathology and structural anomalies, Orbit, Eyelids, Lacrimal system, Conjunctiva, Cornea, Sclera, Anterior chamber, uveal tract, pupils, Lens, Vitreous, Fundus, Oculomotor system, Measurement of refractive status, Determining binocular status, Determining sensory motor adaptability
2. Compensatory treatment and remedial therapy for:
- Myopia, Pseudo myopia, Hyperopia, Astigmatism, Anisometropia & Amblyopia
3. Remedial and compensatory treatment for strabismus and Nystagmus:
- vergence and accommodation

Geriatric Optometry:

1. Structural changes in the eye
2. Physiological changes in the eye
3. Optical and refractive changes in the eye
4. Aphakia, pseudophakia - its correction
5. Ocular diseases common in old eye, with special reference to cataract disorders, vascular diseases of the eye
6. Special considerations in Ophthalmic dispensing to the elderly
 - Management of visual problems of aging
 - How to carry on one's visual tasks overcoming the problems of aging

FRACTICAL

1. Practical work related to pediatric & geriatric optometry
2. Maintaining manual logbooks of the Practical work

Clinical work at Hospital
Subject code - BOPT-306
Min. Hrs. - Practical: 80 Hrs.

Clinical work :

1. Case sheet
2. History taking
3. Lensometry
4. External examination
5. Test for phorias and tropias
6. Visual acuity
7. Objective Refraction
8. Subjective Refraction
9. Keratometry
10. Slit lamp examination (Applanation tonometry)
11. Drugs and method of application
12. Dri's and Don'ts - pupillary dilatation
13. Direct ophthalmoscopes
14. Indirect ophthalmoscopes

For Contact Lens Patients :

1. Patient selection [Type of Contact lens]
2. Performing Procedure of contact lens fitting

- The students of 1st year shall do above the clinical work at Ophthalmology department of the hospital (including OPD & IPD).
- They shall maintain logbooks of patients.
- At the end of academic year their logbooks will be evaluated by the faculty concerned.

Curtesy

[Signature]

HOD, Optometry
Faculty of Paramedical Sciences
UPUMS, Saifal

[Signature]

Dean
Faculty of Paramedical Sciences
UPUMS, Saifal