Dr. S. Krishnaveni
Professor
Chairperson, BOS

Department of Studies in Physics
University of Mysore, Manasagangothri
Mysore-570 006, India

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Proceedings of the Meeting of the Board of Studies in B.Sc. (Optometry Science) (Under Graduate) and M.Sc. (Optometry Science) (Post Graduate) Specialized Programs offered by VTRUST College of Optometry, Kuvempunagar, Mysuru held on 23-05-2025 at 10:00 A.M

Members Present :

1. Dr. S. Krishnaveni	Chairperson
2. Dr. Shahul Hameed	Member
3. Dr. M.G. Jayachandran	Member
4. Sri. Syamlal P	Member
5. Sri. Sandhujlal V	Member
6. Sri. Santhosh Othayoth	Member

Chairperson welcomed all the members of the board and placed the agenda of the meeting. After a deep review, it was unanimously resolved as the follows.

1. Approved the Syllabus and the Methodology of Assessment and Evaluation for in **4 Years B.Sc. (Optometry Science)** and **2 Years M.Sc. (Optometry Science)** programs.

Finally, the Chairperson thanked all the members for their valuable time, support and offering valuable suggestions.

(Dr. S. Krishnaveni)
Chairperson

Dr. KRISHNAVENI.S. M.Sc., Ph.D.
Professor, DOS in Physics
Manasagangotri, University of Mysore
Mysuru - 570 006. India

Bachelor of Science
(Optometry Science)

As per SEP (State Education Policy) Regulations

To be implemented from the Academic year 2025-26

Proposed Scheme & Syllabus for B.Sc. (Optometry Science)
As per SEP (State Education Policy) Regulations

I. OBJECTIVES:

B.Sc. (Optometry Science) is a four year graduate course that provides education and training on everything related to the eye. The course will teach you the fundamentals of eye health, starting from the basics, and give detailed knowledge about all the machinery and devices used in optometry. The course offers extensive scope for graduates in the field of eye health.

II. ELIGIBILITY FOR ADMISSION:

Two year Pre- University Examination or equivalent from a recognized University or Board with Physics, Chemistry and Biology as principle subjects.

III. DURATION OF THE PROGRAM:

The **B.Sc. (Optometry Science)** course is a four-year graduate course usually divided into eight semesters. In last year (7^{th} & 8^{th} Semester) students have an compulsory internship of 1 year for clinical internship training and practice in reputed eye hospitals.

IV. MEDIUM OF INSTRUCTION

The medium of instruction shall be English

V. ATTENDANCE

a. For the purpose of calculating attendance each semester shall be taken as a Unit.
b. A student shall be conserved to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 75% in aggregate of the number of working periods in each of the subjects compulsorily.
c. A student who fails to complete the course in the manner stated should not be permitted to take the University examination.

VI. TEACHING AND EVALUATION

As Post graduate degree from recognized University are only eligible to teach and to evaluate all the U.G. courses, including core subjects, languages, electives and environmental studies.

VII. SKILL DEVELOPMENT RECORD MAINTENANCE

a. Every college is required to establish a dedicated data science lab for the purpose of conducting practical Assignments to be written in the record.
b. In every semester the students should maintain a record book in which a minimum of 5 exercises or activities for course are to be recorded.

VIII. SCHEME OF EXAMINATION

a. There shall be a University examination at the end of each semester and the maximum marks of the universities examination in each paper shall be 80 marks for DSC /DSE/Vocational / OEC and 25 marks for SECVB
b. Internal assessment 20 marks for DSC /DSE /Vocational / OEC and 25 marks for SECVB

Guidelines for Continuous Internal Evaluation and Semester End Examination

The CIE and SEE will carry 20% and 80% weightage each to enable the course to be a valuated for a total of 100 marks it is respective of its credits. The evaluation system ofthe course is comprehensive and continuous during the entire period of the semester. For a course the CIE and SEE evaluation will be on the following parameters.

Sl.No	Parameters for the evaluation	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous and comprehensive Evaluation (CCE)-(A)	10
2	Internal Assessment Test (IAT) (B)	10
	Total of CIE(A+B)	**20**
3	Semester End Examinations (SEE)-(C)	**80**
	Total of CIE and SEE (A+B+C)	**100 Marks**

Continuous Internal Evaluation:

a. Continuous and Comprehensive Evaluation (CCE):

The CCE will carry a maximum of 10% weightage (10 Marks) of total marks of a course before the start of academic session in each semester, a faculty member should choose for his/ her course.

Minimum for 4 of the following assessment methods with 2.5 marks each (4X 2.5=10)

i. Individual assignment (Including Attendance)
ii. Seminars / classroom presentations / quizzes
iii. Group discussion / class discussion / group assignments
iv. Case studies / Caselets
v. Participatory and Industry Integrated Learning/ Industrial Visits
vi. Practical activities / Problem solving exercises
vii. Participation in seminars / Academic events/ Symposia.
viii. Mini projects/Capstone projects

a. **Internal Assessment Test (IAT)**

The IAT will carry a maximum of 10% weightage (10 Marks) of total marks of a course. Under this component, two test will have to be conducted in a semester for 40 marks each and the same is to be scaled down to 10 marks each

Internal Assessment Test

Course Code: Name of the Course:

Duration: 1 Hour Total Marks: 40

Part A

Answer any one of the following questions. (10 Marks) (1X10=10)

1.....

2. .....

Part B

Answer any one of the following questions. (10 Marks) (1X10=10)

3. .....

4. .....

Part C

Answer any two of the following questions. (10 Marks) (2X10=20)

5. .....

6.....

7.....

8.....

Semester End Examination (SEE):

The semester end examination for the courses for which students who get highest during the semester shall be conducted. SEE of the course shall be conducted after fulfilling minimum attendance requirement as per the university norms. The BOE constituted by the University has to prepared the SEE framework and the question paper for SEE is presented below for 80 marks.

PATTERN OF QUESTION PAPER

Time: 3 Hrs.

Maximum: 80 Marks

Section: A (10 x 1 = 10 Marks) Answer ALL questions. - 10 Marks
(Four options for each questions)

Section: B (10 x 5 = 50 Marks) {20 Questions with **'OR'** option) - 50 Marks

Section: C (2 x 10 = 20 Marks) {4 Questions with **'OR'** option) - 20 Marks

Internal Marks – 20

Total (External + Internal) – 100 marks

Minimum Marks for a Pass:

Candidates who have obtained a minimum of 35% marks in semester end examination i.e, 28 marks out of 80 marks of theory examination and 40% in aggregate i.e, total 40 marks out of 100 marks of Semester End Exam and Continuous Internal Evaluation.

Notes:

- 1 hour of lecture is equal to 1 credit
- 2 hours of tutorial is equal to 1 credit (Except Language)
- 2 hours of tutorial is equal to 1 hour of teaching.
- 2 hours of practical is equal to 1 credit
- 2 hours of practical is equal to 1 hour of teaching

Practical classes may be conducted in the computer lab depending on the requirements. One batch of students should not exceed half (i.e, 30 or less than 30 students) of the number of students in each class/section. 2 hours of practical class is equal to 1 hour of teaching, however, whenever it is conducted for the entire class (i.e,) more than 30 students) 2 hours of Practical class is equal to 2 hours of teaching.

UNIVERSITY OF MYSORE

State Education Policy of Bachelor's Degree Program in (OPTOMETRY SCIENCE)

Year 1 Semester I							
Sl. NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Language 1 Malayalam Paper 1	AECC-101	3+0+0	80	20	100	3
2	Language 2 English Paper 1	AECC-102	3+0+0	80	20	100	3
3	Core1 Anatomy & Physiology	DSC-101	3+2+0	80	20	100	4
4	Core2 Physical Optics	DSC-102	3+2+0	80	20	100	4
5	Complementary 1: Bio-Chemistry	DSC-103	4+0+0	80	20	100	4
6	Human Rights	SEC VB	2+0+0	25	25	50	2
	Total Credits						**20**

Year 1 Semester II							
Sl.NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Language 1 Malayalam Paper 2	AECC-201	3+0+0	80	20	100	3
2	Language 2 English Paper 2	AECC-202	3+0+0	80	20	100	3
3	Core Paper 3:Anatomy& Physiology of the Eye	DSC-201	3+2+0	80	20	100	4
4	Core Paper 4 Geometrical Optics	DSC-202	3+2+0	80	20	100	4
5	Complementary Paper 2 Microbiology	DSC-203	3+2+0	80	20	100	4
6	Practical 1 : Physical & Geometrical Optics	OPT P201	0+0+8	80	20	100	4
7	Women's Rights	SEC VB	2+0+0	25	25	50	2
	Total Credits						**24**

Year 2 Semester III							
Sl. NO	Title of Course	Category of Courses	Teaching Hrs per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Language 1 Malayalam Paper 3	AECC - 301	3+0+0	80	20	100	3
2	Language 2 Communicative English Paper 1	AECC - 302	3+0+0	80	20	100	3
3	Core 5 Optometric Optics	DSC 301	3+2+0	80	20	100	4
4	Core 6 Visual Optics 1	DSC 302	3+2+0	80	20	100	4
5	Core 7 Optometric Instruments	DSC 303	3+2+0	80	20	100	4
6	Complementary Paper 3 Pharmacology	DSC 304	4+0+0	80	20	100	4
	Total Credits						**22**

Year 2 Semester IV							
Sl.NO	Title of Course	Category of Courses	Teaching Hrs per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Language I Malayalam Paper 4	AECC - 401	3+0+0	80	20	100	3
2	Language 2 Communicative English Paper 2	AECC - 402	3+0+0	80	20	100	3
3	Core 8 Visual Optics 2	DSC 401	3+2+0	80	20	100	4
4	Core 9 Dispensing Optics	DSC 402	3+2+0	80	20	100	4
5	Core 10 Systemic Disease	DSC 403	4+0+0	80	20	100	4
6	Complementary Paper 4: Pathology	DSC 404	4+0+0	80	20	100	4
7	Major Practical I	OPT P401	0+0+8	80	20	100	4
	Total Credits						**26**

Year 3 Semester V							
Sl. NO	Title of Course	Category of Courses	Teaching Hrs per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Core 11 Contact Lens 1	DSC 501	3+2+0	80	20	100	4
2	Core 12 Ocular Disease 1	DSC 501	3+2+0	80	20	100	4
3	Core 13 Binocular Vision 1	DSC 501	3+2+0	80	20	100	4
4	Core 14 Low Vision Aid	DSC 501	3+2+0	80	20	100	4
5	Core 15 Occupational Optometry	DSC 501	3+2+0	80	20	100	4
6	Common Paper 1 Community Optometry	OEC 1	3+0+0	80	20	100	3
	Total Credits						**23**

Year 3 Semester VI							
Sl.NO	Title of Course	Category of Courses	Teaching Hrs per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Core 16 Contact Lens 2	DSC 601	3+2+0	80	20	100	4
2	Core 17 Ocular disease 2	DSC 602	3+2+0	80	20	100	4
3	Core 18 Binocular Vision 2	DSC 603	3+2+0	80	20	100	4
4	Core 19 Optometry of the Children & the Aged	DSC 604	3+2+0	80	20	100	4
5	Common Paper 2:Environmental Studies	OEC 2	3+0+0	80	20	100	3
6	Major Practical II	OPT P601	0+0+8	80	20	100	4
7	Project & Viva	OPT PJ 601	0+6+6	120	30	150	6
	Total Credits						**29**

Year 4 Semester VII							
	Title of Course	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Core 20 Special Clinic 1		0+0+18	250		250	9
2	Core 21 Special Clinic 2		0+0+18	250		250	9
3							
	Total Credits						**18**

Year 4 Semester VIII							
Sl.NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Core 22 Special Clinics 3		0+0+18	250		250	9
2	Core 23 Special Clinics 4		0+0+18	250		250	9
3							
	Total Credits						**18**

SEMESTER 1

CORE PAPER I - ANATOMY & PHYSIOLOGY

Course Description: General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves and the entire central nervous system in particular. General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neuro physiology.

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

- Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
- Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.
- Explain the normal functioning of various organ systems of the body and their interactions.
- Know the physiological principles underlying pathogenesis of disease

Unit: I

General Anatomy:

Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry - Planes of the body, relationship of structures, organ system, Skeleton System

Tissues of the Body:

Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues

Muscles:

Different types of muscles, their functional differentiation, their relationship with different structures, and their neural supply

Blood vessels:

Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations

Unit: II

Skin and appendages:

Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves

Lymphatic system:

Embryology, functions, relationship with blood vessels and organs

Glands:

Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands

Nervous system:

Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system

Brain and Cranial nerves:

Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves

Unit: III

General Physiology

Cell structure & organization, Tissue organization, Epithelium Connective tissue –
Collagen fibers – Elastic fibers – Areolar fibers
Cartilage – Bone, Contractile tissue – striated – skeletal – cardiac – non striated – plain – myoepithelial - General principles of cell physiology, Physiology of skeletal muscle

BLOOD:

Composition, Volume measurement & variations, Plasma proteins – classification & functions - Red blood cells – development, morphology & measurements – functions & dysfunctions. White blood cells – development – classification, morphology – functions & dysfunctions Platelets – morphology – development, functions & dysfunctions, Clotting – factors – mechanism – anti- coagulants dysfunctions, Blood grouping – classification – importance in transfusion, Rh factor & incompatibility, Suspension stability

DIGESTION:

General arrangement : Salivary digestion – functions & regulations, Gastric digestion – functions & regulations, Pancreatic digestion – functions & regulations, Intestinal digestion – functions & regulations, Liver & bile, Absorption, Motility, Deglutition, Vomiting, Defecation, Functions of large intestine, Neuro humoral regulations of alimentary functions, summary

Unit: IV

EXCRETION:

Body fluids – distribution, measurement & exchange, Kidney – structure of nephron – mechanism of urine formation – composition of the urine and abnormal constituents – urinary bladder & micturition

ENDOCRINES:

Hormone mechanism – negative feed backs – tropic action – permissive action – cellular action, hypothalamic regulation

Thyroid - hormones, actions, regulations
Adrenal cortex - hormones, actions, regulations
Adrenal medulla – hormones, actions, regulations
Parathyroid - hormones, actions, regulations
Islets of pancreas – hormones, actions, regulations
Miscellaneous _ hormones, actions, regulations
Common clinical disorders

Unit: V

REPRODUCTION:

Male reproductive system – control & regulation , Female reproductive system – uterus – ovaries – menstrual cycle – regulation – pregnancy & delivery – breast – family planning

Respiration:

Mechanics of respiration – pulmonary function tests – transport of respiratory gases- neural and chemical regulation of respiration – hypoxia, cyanosis, dyspnoea – asphyxia.

Circulation:

General principles

Heart: myocardium – innervations – transmission of cardiac impulse- Events during cardiac cycle – cardiac output. Peripheral circulation: peripheral resistances – arterial blood pressure – measurements – factors regulation variations – capillary circulation – venous circulation. Special circulation: coronary cerebral – miscellaneous - Environmental Physiology, Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure

Nervous System:

Neuron – Conduction of impulse – synapse – receptor.

Sensory organization – pathways and perception - Reflexes – cerebral cortex – functions. Thalamus – Basal ganglia, Cerebellum., Hypothalamus. - Autonomic nervous system – motor control of movements, posture and equilibrium – conditioned reflex, eye hand co-ordination, Special senses – (Elementary) Olfaction – Taste – Hearing

Texts Books:

1. B D Chaurasia: Handbook of general Anatomy, Third edition, CBS Publishers, New Delhi, 1996
2. GJ Tortora, B Derrickson: Principles of Anatomy and Physiology,11th edition,John Wiley & Sons Inc, 2007

3. John Wiley & Sons Inc, New Jersey, 2007

Reference Books:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition,CBS Publishers, New Delhi, 2006
2. A C Guyton: Text book of Medical Physiology, 6th edition, saunders company, Japan, 1981
3.

SEMESTER I

CORE PAPER II – PHYSICAL OPTICS

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

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

Unit: I

Nature of light – light as electromagnetic oscillation – wave equation; ideas of sinusoidal oscillations – simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase.

Sources of light; Electromagnetic Spectrum.

Unit: II

Polarized light; linearly polarized light; and circularly polarized light.

Intensity of polarized light; Malus' Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle, Birefringence; ordinary and extraordinary rays.

Relationship between amplitude and intensity. Coherence; interference; constructive interference, destructive interference; fringes; fringe width

Unit: III

Double slits, multiple slits, gratings.

Diffraction; diffraction by a circular aperture; Airy's disc

Unit: IV

Resolution of an instrument (telescope, for example); Raleigh's criterion

Scattering; Raleigh's scattering; Tyndall effect.

Fluorescence and Phosphorescence

Unit: V

Basics of Lasers – coherence; population inversion; spontaneous emission; Einstein's theory of lasers.

Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units

Inverse square law of photometry; Lambert's law.
Other units of light measurement; retinal illumination; Trolands **Text Book:**

- Subrahmanyan N, Brij Lal, *A text book of Optics*, S. Chand Co Ltd, New Delhi, India, 2003.

1. Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
2. Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth- Heinemann, Massachusetts, USA, 2002.

SEMESTER I

COMPLEMENTARY PAPER I – BIOCHEMISTRY

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

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

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

Unit: I

Carbohydrates:

Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)

Proteins:

Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, trytophan, glutathione, albumin, hemoglobin, collagen)

Unit: II

Lipids:

Fatty acids, saturated and unsaturated, cholesterol and triacyglycerol, phospholipids and plasma membrane

Vitamins:

General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties

Unit: III

Minerals:

Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties) Hormones and their receptors basic concepts in metabolic regulation with examples, insulin, glucagons and thyroxine

Unit: IV

Metabolism: General whole body metabolism (carbohydrates, proteins, lipids)

Unit: V

Ocular Biochemistry

Various aspects of the eye, viz. tears, cornea, lens, aqueous, vitreous, retina and pigment epithelium rhodopsin. (The important chemicals in each and their roles). Clinical Biochemistry

Blood sugar, urea, creatinine and Bilirubin, cholesterol etc and significance of their estimation.

Text book:

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

Reference Books:
1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990

D.R. Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heineman

SEMESTER I

HUMAN RIGHTS

UNIT – I : Concept of Human Values, Value Education Towards Personal Development

Aim of education and value education; Evolution of value oriented education; Concept of Human values; types of values; Components of value education.

Personal Development :
Self analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers.

Character Formation Towards Positive Personality:
Truthfulness, Constructivity, Sacrifice, Sincerity, Self Control, Altruism, Tolerance, Scientific Vision.

UNIT – II : Value Education Towards National and Global Development

National and International Values:

Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity.
Social Values - Pity and probity, self control, universal brotherhood.
Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith.
Religious Values - Tolerance, wisdom, character.
Aesthetic values - Love and appreciation of literature and fine arts and respect for the same.
National Integration and international understanding.

UNIT – III : Impact of Global Development on Ethics and Values

Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise.
Modern Challenges of Adolescent Emotions and behavior; Sex and spirituality: Comparision and competition; positive and negative thoughts. Adolescent Emotions, arrogance, anger, sexual instability, selfishness, defiance.

UNIT - IV : Theraupatic Measures

Control of the mind through
a. Simplified physical exercise
b. Meditation – Objectives, types, effect on body, mind and soul
c. Yoga – Objectives, Types, Asanas
d. Activities:
(i) Moralisation of Desires
(ii) Neutralisation of Anger
(iii)Eradication of Worries
(iv)Benefits of Blessings

UNIT; V : Human Rights

1. Concept of Human Rights – Indian and International Perspectives
a. Evolution of Human Rights
b. Definitions under Indian and International documents
2. Broad classification of Human Rights and Relevant Constitutional Provisions.
a. Right to Life, Liberty and Dignity
b. Right to Equality
c. Right against Exploitation
d. Cultural and Educational Rights
e. Economic Rights
f. Political Rights
g. Social Rights
3. Human Rights of Women and Children
a. Social Practice and Constitutional Safeguards
(i) Female Foeticide and Infanticide
(ii) Physical assault and harassment
(iii) Domestic violence
(iv) Conditions of Working Women
4. Institutions for Implementation
a. Human Rights Commission
b. Judiciary
5. Violations and Redressel
a. Violation by State
b. Violation by Individuals
c. Nuclear Weapons and terrorism
d. Safeguards.

SEMESTER II

CORE PAPER III – OCULAR ANATOMY & PHYSIOLOGY

Course Description: This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions. Ocular physiology deals with the physiological functions of each part of the eye.

Course Objectives: At the end of the course, the student should be able to:

- Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa and and understand the basic principles of ocular embryology
- Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
- Elucidate the physiological aspects of normal growth and development of the eye.
- List the physiological principles underlying pathogenesis and treatment of disease of the eye.

Unit: I

Anatomy:

Cornea: Anatomy of all the layers, cellular structure, nerve supply, reason for transparency, refractive properties

Coats of eyeball:

Sclera (episclera & sclera), Choroid (Iris, ciliary body, choroid), Retina

Detailed anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for pupillary actions, pupillary pathway. Crystalline lens, Aqueous, anterior chamber, vitreous body

Unit: II

Ocular Embryology

Detailed study of orbit

Ocular Adnexa and Lacrimal system

Extra ocular muscles (anatomy, innervations, action)

Orbital Blood supply

Unit: III

CRANIAL NERVES:

Detailed study of each of the following nerves in terms of their nucluei, course, relationship within brain, effects of compression etc at different regions Optic nerve

Oculomotor nerve
Trochlear nerve
Trigeminal nerve
Abducent nerve
Facial nerve
Visual Pathway, Autonomic Innervations of Ocular structures

Unit: IV

Physiology:
Protective mechanisms in the eye
Precorneal tear film, eyelids and lacrimation
Extrinsic Ocular muscles, their actions and control of their movements
Saccadic, smooth pursuit and Nystagmic eye movements
Coats of the eye ball
Corneal Physiology
Aqueous humor and vitreous: Intra ocular pressure
Iris and pupil

Unit: V

Crystalline lens and accommodation – presbyopia
Retina – structure and functions, dark and Light Adaptations
Vision – general aspects of sensation

Pigments of the eye and photochemistry, electrophysiology The visual stimulus, refractive errors
Visual acuity, vernier acuity and principle of measurement
Visual perception – Binocular vision, stereoscopic vision, optical illusion
Visual pathway, central and cerebral connections, lesions of pathway and effects Colour vision and colour defects. Theories and diagnostic tests

Text Book:

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

Reference Books:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
2. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
3. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

SEMESTER II

CORE PAPER IV – GEOMETRICAL OPTICS

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

field and depth of focus, will also be studied.

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

Unit: I

Nature of light – light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index

Wavefronts – spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distanceRefractive index; its dependence on wavelengthFermat's and Huygen's Principle – Derivation of laws of reflection and refraction (Snell's law) from these principlesPlane mirrors – height of the mirror; rotation of the mirrorReflection by a spherical mirror – paraxial approximation; sign convention; derivation of vergence equation

Imaging by concave mirror, Imaging by convex mirror, Reflectivity; transmittivity, Snell's Law; refraction at a plane surface

Glass slab; displacement without deviation; displacement without dispersion

Thic prisms; angle of prism; deviation produced by a prism; refractive index of the prism

Unit: II

Prisms; angular dispersion; dispersive power; Abbe's number. Definition of crown and flint glasses; materials of high refractive index

Thin prism – definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index

Refraction by a spherical surface; *sign convention*; introduction to spherical aberration using image formed by a spherical surface of a distance object; *sag formula* Paraxial approximation; derivation of vergence equation

Imaging by a positive powered surface, Imaging by a negative powered surface Vergence at a distance formula; effectivity of a refracting surface

Definition of a lens as a combination of two surfaces; different types of lens shapes.

Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths

Unit: III

Newton's formula; linear magnification; angular magnification

Nodal Planes, Thin lens as a special case of thick lens; review of sign convention

Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions

Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions

Prentice's Rule

System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points, System of more than two thin lenses; calculation of equivalent power using magnification formula

Cylindrical Lenses; image formation; relation between cylinder axis and line image orientation Imaging due to two cylinders in contact with axes parallel

Two cylinders in contact with axes perpendicular; line images and their orientations to the cylinders' powers; interval of Sturm; circle of least confusion (CLC); spherical equivalent; position of CLC

Spherical lens and a cylindrical lens in contact; spherical equivalent; interval of Sturm and CLC

Spherocylindrical lens notations – plus/minus cylinder form, cross cylinder/meridian form; transformations between them

Unit: IV

Field stops and apertures; entrance and exit pupils Apertures and defocus blur

Receiver/detector diameter; depth of focus; depth of field

Chromatic Aberrations; methods of removing chromatic aberrations; Abbe number
Monochromatic Aberrations – deviation from paraxial approximation; difference between ray aberrations and wavefront aberrations

Third order aberrations – spherical aberrations; coma; astigmatism; distortion and curvature of fields

Ways of minimizing spherical aberrations – pupil size, bending of lens, shape factor Lens tilt – astigmatism

Higher order aberrations; introduction to Zernike Polynomials

Unit: V

Telescopes – Keplerian, Galilean and Newtonian; position of cardinal points, entrance and exit pupils; magnifications; advantages and disadvantages

Microscopes – magnification; tube length.

Gullstrand's Schematic Eye (GSE); calculation of the power of the cornea, the lens and the eye; axial length; calculation of the position of the cardinal points; magnification

GSE - Purkinje images and their reflectances

GSE - entrance and exit pupils for a 3mm pupil; ocular aberrations – spherical aberrations and coma; chromatic aberrations.

GSE – introduction to refractive errors - myopia and hyperopia; corneal curvature; axial length; far point; blur size calculations; corrections; astigmatism; blur size; circle of least confusion; correction.

GSE - Object closer than at infinity; introduction to accommodation; far point; near point; presbyopia; spectacle and contact Lens corrections - comparison of magnification

Text book:

1. Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
2. Subrahmanyan N, Brij Lal, *A text book of Optics*, S. Chand Co Ltd, New Delhi, India, 2003

Reference Books:

1. Loshin D. S. *The Geometrical Optics Workbook*, Butterworth-Heinemann, Boston, USA, 1991.
2. Schwartz S. H. *Geometrical and Visual Optics: A Clinical Introduction*, McGraw-Hill, New York, USA, 2002.
3. Tunnacliffe A. H, Hirst J. G, *Optics*, The association of British Dispensing Opticians, London, U.K., 1990.

SEMESTER II
COMPLEMENTARY PAPER II – MICROBIOLOGY

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

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

Unit: I

Introduction to Microbiology
Types of Microorganisms
Physiology of Microorganisms – Nutrition, Enzymes, Metabolism and energy, Microbial Growth Sterilization and disinfection in the laboratory

Unit: II

Control of Microbial Growth – Antimicrobial methods and Chemotherapy

Microbes versus Humans- The development of Infection, the disease process, pathogenicity and virulence - Ocular Bacteriology - Gram positive,(Staphylococcus aureus, Staphlococcus epidermidis, Streptococcus, propionibacterium, actinomyces,Nocardia) Bacteria including acid fast bacilli (Myobacterium tuberculosis, Myobacterium leprae)

Unit: III

Ocular Bacteriology - Gram negative Bacteria (pseudomonas, haemophiilus, Brucella, Neisseria, Moraxella) Spirochetes (Treponema, Leptospiraceae)

Unit: V

Virology: Classification of Viruses in Ocular Disease, Rubella, Adenovirus, Oncogenic Viruses (HPV, HBV, EBV, Retroviruses), HIV.

Fungi : Yeasts, Filamentous, Dimorphic - Intracellular parasites - Chlamydia, Protozoa (Taxoplasmosis, Acanthamoeba,) Helminths (Toxocariasis, Filariasis, Onchocerciasis, Trematodes)

Text books:

1. BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
2. M J Pelczar (Jr),ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL Publisher, New Delhi,1993

Reference Books:

1. KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAW HiLL Publisher, NewDelhi, 1994
2. MACKIE & McCartney Practical Medical Microbiology, SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)

SEMESTER II

CORE PRACTICAL I – PHYSICAL & GEOMETRICAL OPTICS

(Examination at the end of second semester)

1. Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp
2. Circular Apertures – measurements of Airy's disc for apertures of various sizes
3. Verification of Malus' Law using a polarizer – analyzer combination
4. Demonstration of birefringence using Calcite crystals
5. Measurement of the resolving power of telescopes.
6. Newton's rings
7. Demonstration of fluorescence and phosphorescence using crystals and paints
8. Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
9. Thin Prism – measurement of deviation; calculation of the prism diopter
10. Image formation by spherical mirrors
11. Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
12. Concave lens – in combination with a convex lens – power determination.
13. Construction of a tabletop telescope – all three types of telescopes.
14. Construction of a tabletop microscope
15. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
16. Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations

17. Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

SEMESTER II

WOMEN'S RIGHTS

UNIT I

Laws, Legal Systems and Change
Definition - Constitutional law, CEDAW and International Human Rights – Laws and Norms – Laws and Social Context – Constitutional and Legal Framework.

UNIT II

Politics of land and gender in India
Introduction – Faces of Poverty – Land as Productive Resources – Locating Identities – Women's Claims to Land – Right to Property - Case Studies.

UNIT III

Women's Rights: Access to Justice
Introduction – Criminal Law – Crime Against Women – Domestic Violence – Dowry Related Harassment and Dowry Deaths – Molestation – Sexual Abuse and Rape – Loopholes in Practice – Law Enforcement Agency.

UNIT IV

Women's Rights
Violence Against Women – Domestic Violence - The Protection of Women from Domestic Violence Act, 2005 - The Marriage Validation Act, 1982 - The Hindu Widow Re-marriage Act, 1856 - The Dowry Prohibition Act, 1961
Annexure – 1-D
SCAA Dt. 21-5-2009

UNIT V

Special Women Welfare Laws
Sexual Harassment at Work Places – Rape and Indecent Representation – The Indecedent Representation (Prohibition) Act, 1986 - Immoral Trafficking – The Immoral Traffic (Prevention) Act, 1956 - Acts Enacted for Women Development and Empowerment - Role of Rape Crisis Centers.

References
1. Nitya Rao "Good Women do not Inherit Land" Social Science Press and Orient Blackswan 2008
2. International Solidarity Network "Knowing Our Rights" An imprint of Kali for Women 2006
3. P.D.Kaushik "Women Rights" Bookwell Publication 2007
4. Aruna Goal "Violence Protective Measures for Women Development and Empowerment" Deep and Deep Publications Pvt 2004
5. Monica Chawla "Gender Justice" Deep and Deep Publications Pvt Ltd.2006
6. Preeti Mishra "Domestic Violence Against Women" Deep and Deep Publications Pvt 2007
7. ClairM.Renzetti, Jeffrey L.Edleson, Raquel Kennedy Bergen, Source Book on

"Violence Against Women" Sage Publications 2001

SEMESTER III

ENGLISH COMMUNICATIVE SKILLS : PAPER 1

CORE PAPER V – OPTOMETRIC OPTICS

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

Course Objectives: Skills/knowledge to be acquired at the end of this course:

- Measurement of lens power , lens centration using conventional techniques
- Transposition of various types of lenses
- Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.)
- Knowledge to select the tool power for grinding process.
- Measurement of surface powers using lens measure.
- Method of laying off the lens for glazing process.
- Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms.
- Knowledge of prism and decentration in ophthalmic lenses
- Knowledge of different types of materials used to make lenses and its characteristics
- Knowledge lens designs – single vision, bifocals, progressive lens
- Knowledge on tinted and protective lenses
- Knowledge on special lenses like iseikonic, spectacle magnifiers.
- Knowledge on spectacle frames – manufacture, materials

Unit: I

Introduction – Light, Mirror, Reflection, Refraction and Absorption
Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prims Lenses – Definition, units, terminology used to describe, form of lenses Vertex distance and vertex power, Effectivity calculations
Lens shape, size and types i.e. spherical, cylindrical and Sphero-cylindrical Transpositions –
Simple, Toric and Spherical equivalent
Prismatic effect, centration, decent ration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses
Spherometer & Sag formula, Edge thickness calculations
Magnification in high plus lenses, Minification in high minus lenses
Tilt induced power in spectacles
Aberration in Ophthalmic Lenses

Unit: II

Raw materials – History and General Outline, Manufacturing of Ophthalmic Blanks – Glass & Plastics, Terminology used in Lens Workshops, Surfacing process from Blanks to lenses Definition & Materials (Glass, Plastics, Polycarbonate, Triology) types and Characteristics Properties (Refractive index, specific gravity, UV cut off, impact resistance – include drop ball test, abbe value, Center thickness)

Unit: III

Best form of lenses & Safety standards for Ophthalmic lenses (FDA, ANSI, ISI, Others) Design of High Powered Lenses - Hi-index lenses, Calculation of Refractive index
Bifocal designs, their manufacturing & uses (Kryptok, Univis D, Executive, Invisible, Occupational) Progressive Addition Lenses, modified near vision lenses (designs, advantages, limitations)

Unit: IV

Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating
Lens defects – Description and Detection
Glazing & edging (manual & automatic)
Special lenses

- Lenticulars
- Aspherics
- Fresnel lenses & Prisms
- Aniseikonic lenses
- Photochromics
- Polaroids
- Tinted lenses – Tints, filters

Project to ensure awareness on lens availability in Indian market

Unit: V

History of Spectacles, manufacturing overview, Definition, parts & measurements
Classification of frames – Materials (cover in detail), Colours and Temple position (advantages & disadvantages, where to use) , Special purpose frames (sports, kids, reading)

Text Books:

1. Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1972

Reference Books:

2. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
3. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

SEMESTER III
CORE PAPER VI – VISUAL OPTICS I

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

Course Objectives: Upon completion of the course, the student should be able:

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

Unit: I

REVIEW OF GEOMETRICAL OPTICS
VERGENCE AND POWER:, Conjugacy, object space and image space. Sign convention Spherical refracting surface, Spherical mirror; catoptric power, Cardinal points, Magnification

Light and visual function
Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism Aberration and application, Spherical and Chromatic

Unit: II

OPTICS OF OCULAR STRUCTURE
Cornea and aqueous
Crystalline lens
Vitreous
Schematic and reduced eye

Unit: III
MEASUREMENTS OF OPTICAL CONSTANTS OF THE EYE Corneal curvature and thickness
Keratometry
3.3 Curvature of the lens and ophthalmophakometry
Axial and axis of the eye
Basic Aspects of Vision.

Unit: IV
Visual Acuity, Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution Science of Measuring visual performance and Application to Clinical Optometry

Unit: V
REFRACTIVE ANOMALIES AND THEIR CAUSES
Etiology of refractive anomalies Contributing variability and their ranges
Populating distributions of anomalies.
Optical component measurements
Growth of the eye in relation to refractive errors

Text books:

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
2. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

Reference Books:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
3. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
4. WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006
5. T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman,USA,2002

SEMESTER III

CORE PAPER VII – OPTOMETRIC INSTRUMENTS & EXAMINATION OF VISUAL SYSTEM

Course Description: This course covers commonly used optometric instruments, its basic principle, description and usage in clinical practice. Also it covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuro ophthalmic examination, pediatric optometry examination, and Glaucoma evaluation.

Course Objectives: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the Optometric & Ophthalmic instruments - And the students will be skilled in knowing the purpose, set-up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures.

Unit: I
REFRACTIVE INSTRUMENTS

- Optotypes and MTF, Spatial Frequency
- Test charts standards.
- Choice of test charts

- Trial case lenses
- Refractor (phoropter) head units
- Optical considerations of refractor units
- Trial frame design
- Near vision difficulties with units and trial frames
- Retinoscope – types available
- Adjustment of Retinoscopes- special features
- Objective optometers.

Infrared optometer devices.

- Projection charts
- Illumination of the consulting room.
- Brightness acuity test
- Vision analyzer
- Pupilometer
- Potential Acuity Meter
- Abberometer

Unit: II

OPHTHALMOSCOPES AND RELATED DEVICES

- Design of ophthalmoscopes - illumination
- Design of ophthalmoscopes- viewing
- Ophthalmoscope disc
- Filters for ophthalmoscopy
- Indirect ophthalmoscope

Unit: III

- Lensometer,Lens gauges or clock
- Slit Lamp , Tonometers
- Keratometer and corneal topography, Refractometer
- Orthoptic Instruments (Synoptophore Only), Color Vision Testing Devices Fields Of Vision And Screening Devices Scans, ERG, New Instruments

Unit: IV

- Examination of Visual System
- History taking, Visual acuity estimation
- Extraocular motility, Cover teat, Alternating cover test, Hirschberg test, Modified Krimsky, Pupils Examination, Maddox Rod, van Herrick,

Unit: V

- External examination of the eye, Lid Eversion
- Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),
- Color Vision, Stereopsis,
- Confrontation test, Photostress test,
- Slitlamp biomicroscopy, Direct Ophthalmoscopy,
- Digital pressure, Schiotz Tonometry, Applanation Tonometry
- Gonioscopy ROPLAS, Amsler test,
- Corneal Sensitivity, HVID
- Saccades and Pursuits

Text books:

1. David Henson: Optometric Instrumentations, Butterworth- Heinnemann, UK, 1991
2. T Grosvenor: Primary Care Optometry, 5th edition, Butterworth – Heinneman, USA, 2007

Reference books:

1. **P R Yoder:** Mounting Optics in Optical Instruments, SPIE Society of Photo-Optical Instrumentation, 2002
2. **G Smith, D A. Atchison:** The Eye and Visual Optical Instruments, Cambridge University Press, 1997
3. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
4. D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
5. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition, Butterworth-Heinemann, 2007
6. J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins,1991
7. N B. Carlson , Dl Kurtz: Clinical Procedures for Ocular Examination ,3rd edition, McGraw-Hill Medical, 2003

SEMESTER III

COMPLEMENTARY PAPER III – PHARMACOLOGY

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

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

- basic principles of Pharmacokinetics and Pharmacodynamics
- commonly used ocular drugs, mechanism, indications, contraindications, drug dosage, and adverse effects.

Unit: I

Pharmacokinetics : Drug absorption, distribution, metabolism and excretion
Pharmacodynamics : Drug Handling by the body – effect of drug and the relationship between drug concentration and response, Drug – Receptor interactions

Unit: II

Ocular Pharmacology : Drug Handling by cells and Tissues - Pharmacokinetics, and Pharmacodynamics– specific to ocular surface and intraocular conditions

Unit: III

Delivery methods of Ocular Medication: Residence in the Conjunctival sac, drug vehicles affect drug delivery, advanced ocular delivery systems
Reconstituting the tear film: Tear Substitutes

Unit: IV

Ocular Drugs and the Autonomic Nervous system: Parasympathetic(antimuscaranic) and Sympathetic
Intraocular pressure Drugs
Eicosanoids : prostaglandins,thromboxaes and leukotrienes
Serotonin : Neurotransmitter; Glucocorticoids, Immunosuppressive agents

Unit: V

Local Anaesthetics, Ocular Toxicity from systemic administration of Drugs

Textbook:

1. K D TRIPATHI: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
2. Ashok Garg: Manual of Ocular Therapeutics, Jaypee, NewDelhi, 1996

Reference Books:

1. T J Zimmerman, K S Kooner, M Sharir, R D Fechtner: Text Book of Ocular Pharmacology, Lippincott-Raven, Philadelphia, 1997

SEMESTER IV

ENGLISH COMMUNICATIVE SKILLS : PAPER 2

CORE PAPER VIII –VISUAL OPTICS II

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

Course Objectives: Upon completion of the course, the student should be able

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

Unit: I

Refractive conditions

- Emmetropia
- Myopia
- Hyperopia
- Astigmatism
- Accommodation
- Presbyopia
- Anisometropia and Aniseikonia
- Aphakia and Pseudophakia

Unit: II

Accommodation

- Far and near points of accommodation
- Correction of spherical ametropia
- Axial versus refractive ametropia
- Relationship between accommodation and convergence, AC / A ratio

Unit: III

Objective refraction

- Streak Retinoscopy only

Unit: IV

Subjective Refraction

- Review of subjective refractive methods
- Cross cylinder methods for astigmatism, Astigmatic Fan Test
- Difficulties in subjective and objective tests and their avoidance
- 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
- Prescribing Prisms / Binocular Refraction

Text books:

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
2. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

Reference Books:

- M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
- HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.

- H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
- WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006
- T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman,USA,2002

SEMESTER IV
CORE PAPER IX – DISPENSING OPTICS

Course Description: This course will deal with the dispensing aspects of spectacle lenses and frames needed to manage the customer in an Optical set up, from counseling to delivering the spectacles.

Course Objective: Skills to be acquired at the end of this course

- Reading of spectacle prescription
- Counseling the patient
- Lens edge thickness calculation
- Frame & lens measurements and selection
- Writing spectacle lens order
- Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
- Lens verification and axis marking and fitting of all lens types
- Final checking of finished spectacle with frame adjustments
- Delivery and follow-up
- Troubleshooting complaints and handling patient's questions.

Unit: I

Components of spectacle prescription & interpretation, transposition, Add and near power relation - Frame selection – based on spectacle prescription, professional requirements, age group, face shape

Unit: II

Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height
Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments
– facial wrap, pantoscopic tilt

Unit: III

Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements) Neutralization – Hand & lensometer, axis marking, prism marking
Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)
Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories – Bands, chains, boxes, slevets, cleaners, screwdriver kit Spectacle repairs – tools, methods, soldering, riveting, frame adjustments

Unit: IV

Special types of spectacle frames

- Monocles
- Ptosis crutches
- Industrial safety glasses
- Welding glasses

Unit: V

Frame availability in Indian market, FAQ's by customers and their ideal answers

Text Book:

- David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
- C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

Reference Book:

- David Wilson, Steve stenersen: Practical optical workshop, OTEN- DE, NSW TAFE Commission, 2002
- Margaret Dowaliby: Practical Aspects of Ophthalmic optics, Fourth edition, Butterworth Heinemann, USA, 2001

SEMESTER IV
CORE PAPER X – SYSTEMIC DISEASE

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

Course Objectives: At the end of the course, students should get acquainted with the following:

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

Unit: I

Hypertension

- Definition, classification, Epidemiology, clinical examination, complications, and management.
- Hypertensive retinopathy

Diabetes Mellitus

- Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications
- Diabetic Retinopathy

- Physiology, testing for thyroid disease, Hyperthyroidism, Hypothroidism, Thyroiditis, Thyroid tumors
- Grave's Ophthalmopathy

Acquired Heart Disease

- Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm
- Ophthalmic considerations

Cancer :

- Incidence
- Etiology
- Therapy
- Ophthalmologic considerations

Unit: II

Connective Tissue Disease

- Rheumatic arthritis
- Systemic lupus erythematosus
- Scleroderma
- Polymyositis and dermatomyositis
- Sjogren syndrome
- Behcet's syndrome
- Eye and connective tissue disease Tuberculosis

Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.

Herpes virus (Herepes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)
Herpes and the eye - Hepatitis (Hepatitis A, B, C)
Acquired Immunodeficiency Syndrome - Anemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)

Unit: III

Common Tropical Medical Ailments

- Malaria
- Typhoid
- Dengue
- Filariases
- Onchocerciasis
- Cysticercosis
- Leprosy

Unit: IV

Nutritional and Metabolic disorders:

- Obesity
- Hyperlipidaemias
- Kwashiorkor
- Vitamin A Deficiency
- Vitamin D Deficiency
- Vitamin E Deficiency
- Vitamin K Deficiency
- Vitamin B_1,B_2, Deficiency
- Vitamin C Deficiency

Myasthenia Gravis

- First Aid
- General Medical Emergencies
- Preoperative precautions in ocular surgeries

Psychiatry

- Basic knowledge of psychiatric condition and
- Patient Management

Unit: V

Genetics

- Introduction to genetics
- Organisation of the cell
- Chromosome structure and cell division
- Gene structure and basic principles of Genetics.
- Genetic disorders and their diagnosis.
- Genes and the eye
- Genetic counseling and genetic engineering.

Text book:

- C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's , Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill , Livingstone. (PPM), 2002
- Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

SEMESTER IV

CORE PRACTICAL II – EXAMINATION OF VISUAL SYSTEM

(Examination at the end of second semester)

1. History taking - General, Specific, Conditions
2. Lensometry

3. Vision Check, Pinhole acuity
4. Push up test (Amplitude of Accommodation)
5. Push up test (Near point of Convergence
6. Tear Break up time
7. Amsler's Grid test
8. Color vision test
9. Schirmer's test
10. Confrontation test
11. Slit lamp examination
12. Finger tension, Schiotz Tonometry, Applanation Tonometry
13. Negative Relative Accommodation
14. Positive Relative Accommodation
15. Von Herick Grading of Anterior chamber depth
16. Accommodative facility(± 2.00 D)
17. IPD
18. HVID
19. Maddox rod (Phoria)
20. Negative Fusional vergence
21. Positive Fusional Vergence
22. Retinoscopy- Static, Dynamic and Cycloplegic Retinoscopy
23. Keratometry
24. Subjective Refraction – JCC, Clock Dial, Duochrome, Borish Delayed

SEMESTER IV
COMPLEMENTARY PAPER IV – PATHOLOGY

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

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

- Inflammation and repair aspects.
- Pathology of various eye parts and adnexa

Unit: I
General Pathology : Principles
Pathophysiology of Ocular Angiogenesis
Ocular Infections

Unit: II
Pathology of cornea and Conjunctiva
Pathology of Uvea
Pathology of Glaucoma

Unit: III
Pathology of Retina
Pathology of retina in systemic disease/disorders
Pathology of eyelids and adnexa

Unit: IV
Pathology of orbital space occupying lesions
Pathology of the optic nerve

Unit: V
Retinoblastoma
Pathology of Lens

Text books:

1. K S Ratnagar: Pathology of the eye & orbit, Jaypee brothers Medical Publishers, 1997

Reference books:

- CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
- S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

SEMESTER V
CORE PAPER XI– CONTACT LENS I

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

Course Objectives: Upon completion of the course, the student should be able to:

- Understand the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Unit: I

Introduction to Contact lenses

- Definition
- Classification / Types
- History of Contact Lenses

Unit: II

Optics of Contact Lenses

- Magnification & Visual field
- Accommodation & Convergence
- Back & Front Vertex Power / Vertex distance calculation

Review of Anatomy & Physiology of

- Tear film
- Cornea
- Lids & Conjunctiva

Unit: III

Introduction to CL materials

- Monomers, Polymers

Properties of CL materials

- Physiological (Dk, Ionicity, Water content)
- Physical (Elasticity, Tensile strength, Rigidity)
- Optical (Transmission, Refractive index)

Indications and contraindications Parameters / Designs of Contact Lenses & Terminology

RGP Contact Lens materials

Manufacturing Rigid and Soft Contact Lenses – various methods

Unit: IV

Pre-Fitting examination – steps, significance, recording of results

Correction of Astigmatism with RGP lens

Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses

Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses
Calculation and finalising Contact lens parameters
Ordering Rigid Contact Lenses – writing a prescription to the Laboratory Checking and verifying Contact lenses from Laboratory Modifications possible with Rigid lenses

Unit: V

Common Handling Instructions

- Insertion & Removal Techniques
- Do's and Dont's
- Cleaning agents & Importance
- Rinsing agents & Importance
- Disinfecting agents & importance
- Lubricating & Enzymatic cleaners

Follow up visit examination Complications of RGP lenses

Text books:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3

Reference books:

1. Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
2. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
3. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

SEMESTER V
CORE PAPER XII – OCULAR DISEASE I

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

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

- on the etiology,
- epidemiology,
- symptoms,
- signs,
- course sequelae of ocular disease,
- diagnostic approach, and
- management of the ocular diseases.

Unit: I

a) **ORBIT**

- Applied Anatomy
- Proptosis Classification,Causes,Investigations)
- Enophthalmos
- Developmental Anomalies
- (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)
- Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis)
- Grave's Ophthalmopathy
- Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma)
- Orbital blowout fractures
- Orbital surgery (Orbitotomy)
- Orbital tumors
- Orbital trauma

- Approach to a patient with proptosis

Unit: II

b) **LIDS**

- Applied Anatomy
- Congenital anomalies
- Oedema of the eyelids (Inflammatory, Solid, Passive edema)
- Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion,
- Internal hordeolum,,Molluscum Contagiosum)
- Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis).
- Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)

b) **LACRIMAL SYSTEM**

- Applied Anatomy
- Tear Film
- The Dry Eye (Sjogren's Syndrome)
- The watering eye (Etiology, clinical evaluation)
- Dacryocystitis
- Swelling of the Lacrimal gland (Dacryoadenitis)

Unit: III

d) **CONJUNCTIVA**

- Applied Anatomy
- Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis)
- Degenerative conditions
  (Pinguecula, Pterygium, Concretions)
- Symptomatic conditions
  (Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration)
- Cysts and Tumors

Unit: IV

e) **CORNEA**

- Applied Anatomy and Physiology
- Congenital Anomalies
- (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)
- Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative
- Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic)
- Degenerations (classifications, Arcus senilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration,
- Droplet keratopathy, Pellucid Marginal degeneration)
- Dystrophies (Reis Buckler dystrophy,Recurrent corneal erosion syndrome, Granualr dystrophy,Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy)
- Keratoconus, Keratoglobus
- Corneal oedema, Corneal opacity, Corneal vascularisation

Penetrating Keratoplasty

Unit: V

f) **UVEAL TRACT AND SCLERA**

- Applied Anatomy,
- Classification of uveitis
- Etiology
- Pathology
- Anterior Uveitis
- Posterior Uveitis
- Purulent Uveitis
- Endophthalmitis
- Panophthalmitis
- Pars Planitis

- Tumors of uveal tract(Melanoma)
- Episcleritis and scleritis

Clinical examination of Uveitis and Scleritis

Text books:

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

Reference Books:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

SEMESTER V
CORE PAPER XIII – BINOCULAR VISION I

Course Description:

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

Course Objectives:

- On successful completion of this module, a student will be expected to be able to:-
- Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extroocular muscles.
- Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies.
- Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

Unit: I

Binocular Vision and Space perception.

- Relative subjective visual direction.
- Retino motor value
- Grades of BSV
- SMP and Cyclopean Eye
- Correspondence,
- Fusion, Diplopia, Retinal rivalry
- Horopter
- Physiological Diplopia and Suppression
- Stereopsis, Panum's area, BSV.
- Stereopsis and monocular clues - significance.
- Egocentric location, clinical applications.
- Theories of Binocular vision.

Unit: II

Anatomy of Extra Ocular Muscles.

- Rectii and Obliques, LPS.
- Innervation & Blood Supply.
- Physiology of Ocular movements.
- Center of rotation, Axes of Fick.
- Action of individual muscle.

Laws of ocular motility

- Donder's and Listing's law
- Sherrington's law
- Hering's law

Unit: III

Uniocular & Binocular movements - fixation, saccadic & pursuits.

- Version & Vergence.
- Fixation & field of fixation
- Near Vision Complex
- Accommodation
- Definition and mechanism (process).
- Methods of measurement.
- Stimulus and innervation.
- Types of accommodation.
- Anomalies of accommodation – aetiology and management.

Unit: IV

Convergence

- Definition and mechanism.
- Methods of measurement.
- Types and components of convergence - Tonic, accommodative, fusional, proximal.
- Anomalies of Convergence – aetiology and management.
- Sensory adaptations Confusion
- Suppression Investigations
- Management Blind spot syndrome

Unit: V

- Abnormal Retinal Correspondence
- Investigation and management
- Blind spot syndrome
- Eccentric Fixation
- Investigation and management
- Amblyopia Classification
- Aeitiology Investigation Management

Text Books:

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

SEMESTER V
CORE PAPER XIV – LOW VISION AID

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

Course Objectives: At the end of the course , the student will be knowledgeable in the following:

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

Unit: I

Definitions & classification of Low vision
Epidemiology of low vision

Unit: II

Model of low vision service
Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision,
Types of low vision aids – optical aids, non-optical aids & electronic devices

Unit: III

Optics of low vision aids
Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training,
Pediatric Low Vision care

Unit: IV

Low vision aids – dispensing & prescribing aspects
Visual rehabilitation & counseling
Legal aspects of Low vision in India

Unit: V

Case Analysis

Text books:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, E Vaithilingam: practice of
2. Low vision – A guide book, Medical Research Foundation, 2000.

Reference Books:

1. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
2. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
3. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

SEMESTER V
CORE PAPER XV – OCCUPATIONAL OPTOMETRY

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

Course Objectives: At the end of the course the students will be knowledgeable in the following aspects:

- In visual requirements of jobs;
- In effects of physical, chemical and other hazards on eye and vision;
- To identify occupational causes of visual and eye problems;
- To be able to prescribe suitable corrective lenses and eye protective wear and to set visual requirements, standards for different jobs.

Unit: I

Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc, Acts and Rules - Factories Act, WCA,ESI Act.

Unit: II

Electromagnetic Radiation and its effects on Eye

Light – Definitions and units, Sources, advantages and disadvantages, standards Color – Definition, Color theory, Color coding, Color defects, Color Vision tests

Unit: III

Occupational hazards and preventive/protective methods
Task Analysis

Unit: IV

Industrial Vision Screening – Modified clinical method and Industrial Vision test Vision Standards – Railways, Roadways, Airlines

Unit: V

Visual Display Units
Contact lens and work

Text Books:

1. R V North: Work and the eye, Second edition, Butterworth Heinnemann, 2001

Reference Books:

1. G W Good: Occupational Vision Manual available in the following website: www.aoa.org
2. N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
3. G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

SEMESTER VI
CORE PAPER XVI – CONTACT LENS II

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

Course Objectives: Upon completion of the course, the student should be able to:

- Understand the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Unit: I

SCL Materials & Review of manufacturing techniques
Comparison of RGP vs. SCL
Pre-fitting considerations for SCL
Fitting philosophies for SCL

Unit: II

SCL fitting assessment
Types of fit – Steep, Flat, Optimum
Calculation and finalising SCL parameters

Disposable lenses
Advantages and availability

Unit: III

Soft Toric CL

- Stabilization techniques
- Parameter selection
- Fitting assessment

Unit: IV

Common Handling Instructions

- Insertion & Removal Techniques
- Do's and Dont's

Care and Maintenance of Soft lenses

- Cleaning agents & Importance
- Rinsing agents & Importance
- Disinfecting agents & importance
- Lubricating & Enzymatic cleaners

- Follow up visit examination Complications of Soft lenses
- Therapeutic contact lenses
- Indications
- Fitting consideration

Unit: V

Specialty fitting

- Aphakia
- Pediatric
- Post refractive surgery
- Introduction to Bifocal CL

Text books:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3

Reference books:

1. Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
2. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
3. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

SEMESTER VI
CORE PAPER XV II – OCULAR DISEASE II

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

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

- On the etiology,
- Epidemiology,
- Symptoms,
- Signs,
- Course sequelae of ocular disease,
- Diagnostic approach, and
- Management of the ocular diseases.

Unit: I

Retina and Vitreous:

- Applied Anatomy
- Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery)
- Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic)
- Retinal Vasculitis (Eales's)
- Retinal Artery Occlusion (Central retinal Artery occlusion)
- Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion)
- Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations
- Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration.
- Retinal Detachement: Rhegmatogenous, Tractional, Exudative)
- Retinablastoma

Unit: II

Ocular Injuries:

Terminology : Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, peforating injury)

- Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis)
- Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational)
- Clinical approach towards ocular injury patients

Unit: III

Lens

- Applied Anatomy and Physiology
- Clinical examination
- Classification of cataract
- Congenital and Developmental cataract
- Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic)
- Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar.
- Management of cataract (Non surgical and surgical measures; preoperative evaluation, Types of surgeries,)
- Complications of cataract surgery
- Displacement of lens: Subluxation, Displacement
- Lens coloboma, Lenticonus, Microsperophakia.

Unit: IV

Clinical Neuro-ophthalmology

- Anatomy of visual pathway
- Lesions of the visual pathway
- Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect,
- Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robetson pupil, Adie's tonic pupil)
- Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy
- Cortical blindness
- Malingering
- Nystagmus
- Clinical examination

Unit: V

Glaucoma

- Applied anatomy and physiology of anterior segment
- Clinical Examination
- Definitions and classification of glaucoma
- Pathogenesis of glaucomatous ocular damage
- Congenital glaucomas

- Primary open angle glaucoma
- Ocular hypertension
- Normal Tension Glaucoma
- Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure)
- Secondary Glaucomas

Management : common medications, laser intervention and surgical techniques

Text books:

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

Reference Books:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth- Heinemann, 2007

SEMESTER VI
CORE PAPER XV III – BINOCULAR VISION II

Course Description:

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

Course Objectives:

- On successful completion of this module, a student will be expected to be able to:-
- Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extroocular muscles.
- Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies.
- Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

Unit: I

Neuro-muscular anomalies, Classification and etiological factors

History – recording and significance.

Convergent strabismus

- Accommodative convergent squint
- Classification
- Investigation and Management
- B Non accommodative Convergent squint
- Classification
- Investigation and Management

Unit: II

Divergent Strabismus
Classification
A& V phenomenon
Investigation and
Management

Unit: III

Vertical strabismus
Classification
Investigation and
Management

Unit: IV

Paralytic Strabismus
Acquired and Congenital
Clinical Characteristics
Distinction from comitant and restrictive Squint
Investigations

- History and symptoms
- Head Posture
- Diplopia Charting
- Hess chart
- PBCT
- Nine directions
- Binocular field of vision

Non surgical Management of Squint

Unit: IV

Restrictive Strabismus
Features

- Musculo fascical anomalies
- Duane's Retraction syndrome
- Clinical features and management
- Brown's Superior oblique sheath syndrome
- Strabismus fixus
- Congenital muscle fibrosis
- Surgical management

Text Books:

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

SEMESTER VI
CORE PAPER XIX– GERIATRIC & PEDIATRIC OPTOMETRY

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

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

Course Objectives:

The student on taking this course should

- Be able to identify, investigate the age related changes in the eyes.
- Be able to dispense spectacles with proper instructions.
- Adequately gained knowledge on common ocular diseases
- Have a knowledge of the principal theories of childhood development, and visual development
- Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
- Be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders
- Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
- Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
- Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing. .

Unit: I
Geriatric Optometry

Structural , and morphological changes of eye in elderly Physiological changes in eye in the course of aging.

Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)

Optometric Examination of the Older Adult

Unit: II
Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
Contact lenses in elderly
Pharmacological aspects of aging
Low vision causes, management and rehabilitation in geriatrics.
Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

Unit: III
Pediatric optometry
Pediatric optometry
The Development of Eye and Vision
History taking Paediatric subjects
Assessment of visual acuity
Normal appearance, pathology and structural anomalies of a) Orbit, Eye lids, Lacrimal system,Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
c) Lens, vitreous, Fundus Oculomotor system

Unit: IV
Refractive Examination
Determining binocular status
Determining sensory motor adaptability
Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
Remedial and Compensatory treatment of Strabismus and Nystagmus

Unit: V

Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics
Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism
Spectacle dispensing for children
Paediatric contact lenses
Low vision assessment in children

Text books :

1. A.J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007
2. Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
3. Paediatric Optometry – William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

References:

1. OP Sharma: Geriatric Care – A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
2. VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998
3. DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002
4. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
5. Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
6. Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

SEMESTER VI
CORE PRACTICAL III – CONTACT LENS & LOW VISION AID

1. Pre fitting evaluation
2. RGP CL insertion & Removal
3. Fitting assessment
4. Over refraction
5. Follow up examination
6. SCL insertion & Removal
7. Fitting assessment
8. Over refraction
9. Follow-up Examination
10. Toric contact lens fitting and assessment
11. Cosmetic contact lens fitting and assessment
12. Attending in low vision care clinic and history taking.
13. Determining the type of telescope and its magnification (Direct comparison method & calculated method)
14. Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
15. Inducing visual impairment and prescribing magnification.
16. Determining reading speed with different types of low vision aids with same magnification.
17. Determining reading speed with a low vision aid of different magnifications.

ELECTIVE 1-A
COMMUNITY OPTOMETRY

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

Course Objectives: At the end of the course students will be be knowledgeable in the following areas:

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

Unit: I

Public Health Optometry: Concepts and implementation
Dimensions, determinants and indicators of health
Levels of disease prevention and levels of health care patterns

Unit: II

Epidemiology of blindness – Defining blindness and visual impairment
Eye in primary health care
Contrasting between Clinical and community health programs

Unit: III

Community Eye Care Programs
Community based rehabilitation programs
Nutritional Blindness with reference to Vitamin A deficiency
Vision 2020: The Right to Sight

Unit: IV

Screening for eye diseases
National and International health agencies, NPCB Role of an optometrist in Public Health
Organization and Management of Eye Care Programs – Service Delivery models Health manpower and planning & Health Economics

Unit: V

Evaluation and assessment of health programmes
Optometrists role in school eye health programmes
Basics of Tele Optometry and its application in Public Health
Information, Education and Communication for Eye Care programs

Text books:

1. GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002
2. Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C
3. K Park: Park's Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007

Reference books:

1. MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002

ELECTIVE 2-A
ENVIRONMENTAL STUDIES

Unit – 1

The multidisciplinary nature of environmental studies Definition, scope and importance. Need for Public awareness.

Unit – 2

Natural Resources: Renewable and non-renewable resources. Natural resources and associated problems

- Forest Resources: use and over- exploitation, deforestation, case studies. Timber
- extraction, mining, dams and their effects on forest and tribal people.
- Water Resources: use and over- exploitation of surface and ground water, floods,
- droughts, dams - benefits and problems.
- Mineral Resources: use and exploitation, environmental effects of extracting and
- using mineral resources, case studies- with reference to Karnataka
- Food Resources: World food problems, changes caused by agricultural and
- overgrazing. Effects of modern agriculture, fertilizer - pesticide problems, water
- logging, salinity, case studies.
- Energy Resources: growing energy needs, Renewable and nonrenewable energy
- Resources, use of alternate energy sources, case studies.
- Land Resources: Land as a resource, land degradation, (man induced landslides),
- soil erosion and desertification.
- Role of an individual in conservation of natural resources. Equitable use of
- resources for sustainable lifestyles.

Unit – 3

Ecosystem: Concept of an ecosystem. Structure and function of an ecosystem, Producers,consumers and decomposers. Energy flow in an ecosystem. Food chains, food web and ecological pyramids. Introduction, types, characteristic feature, structure and function of the following ecosystem

1. Forest ecosystem
2. Grassland ecosystem
3. Desert ecosystem
4. Aquatic ecosystem (ponds)

Unit – 4

Biodiversity and its Conservation: Introduction - Definition, genetic, species, ecosystem diversity. Biogeographically classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option value. India as a mega - diversity nation.
Hot - spots of Biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In - situ and Ex - situ conservation Important National Parks of India

1. Nagarahole National Park
2. Bandipur National Park
3. Gir National Park
4. Kaziranga National Park

Unit – 5

Environmental Pollution: Definition-causes, effects and control measures of:

a. Air Pollution b. Water Pollution
c. Soil Pollution d. Marine Pollution
e. Noise Pollution f. Thermal Pollution
g.Nuclear hazards

Solid Waste management: causes, effects and control measures of urban and industrial wastes Role of an individual in prevention of pollution Pollution case studies with respect to India. Examples

1. Bhopal Gas Tragedy
2. Photochemical smog of Mumbai
3. River Ganga pollution

Disaster Management: floods, earthquakes, cyclones and landslides Disaster Management information systems and efforts of Indian government to tackle the problem

References:

1. Agarwal K.C.(2000) Biodiversity, Agrobios, Jadhpur
2. Agarwal K.C.(2001) Environmental Biology, Nidi Publications, Bikaner.
3. Biodiversity Hot spots for conservation priorities Nature 403:853, fifth report, New Delhi; centre for science and environment.
4. E.P.Odum (1971) Fundamental of Ecology, W.B.Saunders Co.USA.
5. S.Sinha, M Shukla and R.Shukla (2005) Text Book of Environmental Studies by AITBS, New Delhi.

6. Hand Book on Environmental laws by R.K.Trivedy.
7. Environmental Studies by Dr.Syed Fasihuddin Vidyanidhi Prakashana Gadag.
8. Ecology and Environment 10th revised edition by P.D.Sharma, Rastogi publications.
9. Text Book of Environmental Studies – student edition (2009), Saraswati purohit for Student Edition India.
10. Text Book of Environmental Studies by Dr.Rajendra.
11. FSI (1999) FRA 2000 input tables of India. Dehradun; India. Forest Survey of India, Ministry of Environment and forest.

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Master of Science
(Optometry Science)

As per CBCS (Choice Based Credit System) Regulations

To be implemented from the Academic year 2025-26

Proposed Scheme & Syllabus for M.Sc. (Optometry Science)

As per CBCS (Choice Based Credit System) Regulations

I. OBJECTIVES:

M.Sc. (Optometry Science) is a Two year Post Graduate course that provides education and training on everything related to the eye. The course will teach you the fundamentals of eye health, starting from the basics, and give detailed knowledge about all the machinery and devices used in optometry. The course offers extensive scope for graduates in the field of eye health.

II. ELIGIBILITY FOR ADMISSION:

1. A pass in B.Sc. / B.Voc Optometry course from UGC approved University with regular mode with minimum of 50 % marks .
2. Candidates Passing B.Sc. / B.Voc. Optometry through correspondence course shall not be eligible.

III. DURATION OF THE PROGRAM:

The **M.Sc. (Optometry Science)** course is a Two-year Post Graduate course usually divided into four semesters. There shall be a minimum of 90 teaching days in a semester.

IV. MEDIUM OF INSTRUCTION

The medium of instruction shall be English

V. ATTENDANCE

a. For the purpose of calculating attendance each semester shall be taken as a Unit.
b. A student shall be conserved to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 80 % in aggregate of the number of working periods in each of the subjects compulsorily.
c. A student who fails to complete the course in the manner stated should not be permitted to take the University examination.

VI. TEACHING AND EVALUATION

As Post graduate degree from recognized University with minimum of four year teaching experience are only eligible to teach and to evaluate all the P.G. courses and others.

VII. SKILL DEVELOPMENT RECORD MAINTENANCE

a. Every college is required to establish a dedicated data science lab for the purpose of conducting practical Assignments to be written in the record.
b. In every semester the students should maintain a record book in which a minimum of 5 exercises or activities for course are to be recorded.

VIII. SCHEME OF EXAMINATION

a. There shall be a University examination at the end of each semester and the maximum marks of the universities examination in each paper shall be 80 marks for DSC /DSE/Vocational / OEC and 25 marks for SECVB
b. Internal assessment 20 marks for DSC / DSE /Vocational / OEC and 25 marks for SECVB
c. Candidate shall obtain minimum 50% marks for pass, separately for end semester (University) theory and practical examinations.

Guidelines for Continuous Internal Evaluation and Semester End Examination

The CIE and SEE will carry 20% and 80% weightage each to enable the course to be a valuated for a total of 100 marks it is respective of its credits. The evaluation system of the course is comprehensive and continuous during the entire period of the semester. For a course the CIE and SEE evaluation will be on the following parameters.

Sl.No	Parameters for the evaluation	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous and comprehensive Evaluation (CCE)-(A)	10
2	Internal Assessment Test (IAT) (B)	10
	Total of CIE(A+B)	**20**
3	Semester End Examinations (SEE)-(C)	**80**
	Total of CIE and SEE (A+B+C)	**100 Marks**

Continuous Internal Evaluation:

a. Continuous and Comprehensive Evaluation (CCE):

The CCE will carry a maximum of 10% weightage (10 Marks) of total marks of a course before the start of academic session in each semester, a faculty member should choose for his/ her course.

Minimum for 4 of the following assessment methods with 2.5 marks each (4 X 2.5=10)

i. Individual assignment (Including Attendance)
ii. Seminars / classroom presentations / quizzes
iii. Group discussion / class discussion / group assignments
iv. Case studies / Caselets
v. Participatory and Industry Integrated Learning/ Industrial Visits
vi. Practical activities / Problem solving exercises
vii. Participation in seminars / Academic events/ Symposia.
viii. Mini projects/Capstone projects

a. **Internal Assessment Test (IAT)**

The IAT will carry a maximum of 10% weightage (10 Marks) of total marks of a course. Under this component, two test will have to be conducted in a semester for 40 marks each and the same is to be scaled down to 10 marks each

Internal Assessment Test

Course Code: Name of the Course:

Duration: 1 Hour Total Marks: 40

Part A

Answer any one of the following questions. (10 Marks) (1X10=10)

1.....

2. .....

Part B

Answer any one of the following questions. (10 Marks) (1X10=10)

3. .....

4. .....

Part C

Answer any two of the following questions. (10 Marks) (2X10=20)

5. .....

6.....

7.....

8.....

Semester End Examination (SEE):

The semester end examination for the courses for which students who get highest during the semester shall be conducted. SEE of the course shall be conducted after fulfilling minimum attendance requirement as per the university norms. The BOE constituted by the University has to prepared the SEE framework and the question paper for SEE is presented below for 80 marks.

PATTERN OF QUESTION PAPER

Time: 3 Hrs.

Maximum: 80 Marks

Section: A (10 x 1 = 10 Marks) Answer ALL questions. - 10 Marks
(Four options for each questions)

Section: B (10 x 5 = 50 Marks) {20 Questions with **'OR'** option) - 50 Marks

Section: C (2 x 10 = 20 Marks) {4 Questions with **'OR'** option) - 20 Marks

Internal Marks – 20

Total (External + Internal) – 100 marks

Minimum Marks for a Pass:

Candidates who have obtained a minimum of 50% marks in end semester examination. 50 marks out of 100 marks of Semester End Exam and Continuous Internal Evaluation.

Notes:

- 1 hour of lecture is equal to 1 credit
- 2 hours of tutorial is equal to 1 credit (Except Language)
- 2 hours of tutorial is equal to 1 hour of teaching.
- 2 hours of practical is equal to 1 credit
- 2 hours of practical is equal to 1 hour of teaching

Practical classes may be conducted in the computer lab depending on the requirements. One batch of students should not exceed half (i.e, 30 or less than 30 students) of the number of students in each class/section. 2 hours of practical class is equal to 1 hour of teaching, however, whenever it is conducted for the entire class (i.e,) more than 30 students) 2 hours of Practical class is equal to 2 hours of teaching.

UNIVERSITY OF MYSORE

Choice Based Credit System of Master's Degree Program in (OPTOMETRY SCIENCE)

Year 1 Semester I							
Sl. NO	Title of Course	Category of Courses	Teaching Hrs per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Paper I -Advanced Dispensing Optics	DSC101	3+0+0	80	20	100	3
2	Paper II - Low Vision Rehabilitation	DSC102	3+2+0	80	20	100	4
3	Paper III -Clinical Optics	DSC103	4+0+0	80	20	100	4
4	Special Clinic 1	OPT101	0+0+8	80	20	100	4
5	Elective Paper 1 : Eye Banking	OEC1	2+0+0	25	25	50	2
	Total Credits						**17**

Year 1 Semester II							
Sl.NO	Title of Course	Category of Courses	Teaching Hrs per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Paper IV- Orthoptics & Vision Therapy	DSC201	3+2+0	80	20	100	4
2	Paper V - Clinical Optometry 1	DSC202	3+0+0	80	20	100	3
3	Paper VI Advanced Contact Lens 1	DSC203	3+2+0	80	20	100	4
4	Special Clinic 2	OPT201	0+0+8	80	20	100	4
5	Elective Paper 2 : First Aid	OEC2	2+0+0	25	25	50	2
	Total Credits						**17**

UNIVERSITY OF MYSORE

Choice- Based Credit System of Master's Degree Program in OPTOMETRY SCIENCE

Year 2 Semester III							
Sl. NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	*Paper VII - Clinical Optometry - II*	DSC 301	3+0+0	80	20	100	3
2	*Paper VIII-Advanced Contact Len s – II*	DSC 302	3+2+0	80	20	100	4
3	*Paper IX Advanced Glaucoma - I*	DSC 303	3+2+0	80	20	100	4
4	*Special Clinic III*	OPT 301	0+0+8	80	20	100	4
5	*Elective Paper III - Community Optometry*	OEC3	2+0+0	25	25	50	2
	Total Credits						**17**

Year 2 Semester IV							
Sl.NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	*Paper X -Clinical Optometry - III*	DSC 401	3+0+0	80	20	100	3
2	*Paper XI-Ophthalmic Imaging*	DSC 402	3+2+0	80	20	100	4
3	*Paper XII- Advanced Glaucoma - II*	DSC 403	3+2+0	80	20	100	4
4	*Special Clinic IV*	OPT 401	0+0+8	80	20	100	4
5	*Project*	OPT PJ 401	0+6+10	160	40	200	8
6	*Elective Paper IV- Refractive Surgeries*	OEC4	2+0+0	25	25	50	2
	Total Credits						**25**

Semester I

Paper I : ADVANCED DISPENSING OPTICS

Unit 1

Ophthalmic lens materials and designs types:

a) *Aspheric, atoric, High Index lenses and special purpose lenses.*
b) *Absorptive and protective lenses.*
c) *Theory and practical aspects.*
d) *Toughening – methods, uses and application*
e) *Sunglasses – Tinted, Photochromic, Polaroid lenses*

Unit II

Lens surfacing and terminology

a) *Ophthalmic raw materials – history and recent development*
b) *Manufacturing of Ophthalmic lenses – Glass, Plastics and new generation materials.*
c) *ISI Standards for ophthalmic lenses.*

Unit III

Progressive and multifocal lenses:

a) *Properties and Material*
b) *Bifocal and multifocal lenses.*
c) *Selecting appropriate progressive lens.*
d) *Wave front design and new types of progressive lens – market availability*

Unit IV

Guidelines for safety standards for spectacles in –

a) *Children*
b) *Sports*
c) *Uniocular patient*

Unit V

Spectacle frames for -

a) *Photophobia and glare*
b) *Presbyopia*
c) *High refractive errors*
d) *Squint and oculo-motor problems.*

Semester I

Papr II: LOW VISION REHABILITATION

Unit I

Visual Disorders – Medical Perspective

a. *The Epidemiology of Vision Impairment*
b. *Vision Impairment in the pediatric population*
c. *Ocular Diseases :*
    i. *Age – Related Cataract,*
    ii. *Glaucoma*
    iii. *ARMD*
    iv. *Diabetic retinopathy*
    v. *Corneal Disorders*
    vi. *Ocular Trauma*
    vii. *Sensory Neuro-ophthalmology and Vision Impairment*
    viii. *Refractive Disorders*

Visual Disorders – The Functional Perspective

d. *Low Vision and Psychophysics*
e. *Visual Functioning in Pediatric Populations with Low Vision*
f. *Perceptual correlates of Optical Disorders*
g. *Functional aspects of Neural Visual Disorders of the eye and Brain*
h. *Visual Disorders and Performance of specific Tasks requiring vision*

Visual Disorders – The Psychosocial Perspective

i. *Developmental perspectives – Youth*
j. *Vision Impairment and Cognition*
k. *Spatial orientation and Mobility of people with vision impairments*
l. *Social skills Issues in vision impairment*
m. *Communication and language : Issues and concerns*
n. *Developmental perspectives on Aging and vision loss*
o. *Vision and cognitive Functioning in old age*

Unit II

Interactions of Vision Impairment with other Disabilities and sensory Impairments.

a. *Children with Multiple Impairments*
b. *Dual Vision and Hearing Impairment*
c. *Diabetes Mellitus and Vision Impairment*
d. *Vision Problems associated with Multiple Sclerosis*
e. *Vision Impairment related to Acquired Brain Injury*
f. *Vision and Dementia*
g. *Low Vision and HIV infection*

The Environment and Vision Impairment: Towards Universal Design

h. *Indian Disabilities act*
i. *Children's Environments*
j. *Environments of Older people*
k. *Outdoor environments*
l. *Lighting to enhance visual capabilities*
m. *Signage and way finding*
n. *Accessible Environments through Technology*

Unit III

- Vision Rehabilitation:
    a. *In Western Countries*
    b. *In Asia*
    c. *Personnel preparation in Vision Rehabilitation*

Psychological and social factors in visual Adaptation and Rehabilitation

d. *The Role of psychosocial Factors in adaptation to vision Impairment and Habilitation outcomes for Children and Youth*
e. *The Role of psychosocial Factors in adaptation to vision Impairment and Habilitation outcomes for Adults and Older adults*
f. *Social support and adjustment to vision Impairment across the life span*
g. *The person – Environment perspective of vision impairment*
h. *Associated Depression, Disability and rehabilitation*
i. *Methodological strategies and issues in social research on vision Impairment and rehabilitation*

Unit IV

a) *Habilitation of Children and Youth with vision Impairment*
b) *Rehabilitation of working –age Adults with Vision Impairment*
c) *Rehabilitation of older Adults with Vision Impairment*
d) *Functional consequences of vision Impairment*
e) *Vision evaluation of Infants*
f) *Educational assessment of visual function in Infants and Children*
g) *Functional Evaluation of the Adult*
h) *Functional orientation and Mobility*
i) *Functional Assessment of Low Vision for Activities of Daily living*

Unit V

a) *Psychosocial assessment of adults with vision impairment*
b) *Assistive Devices and Technology for Low Vision*
c) *Assistive Devices and Technology for Blind*
d) *Vision and Reading - Normals Vs Low Vision*
e) *Clinical Implications of color vision Deficiencies*
f) *Electro diagnosis in evaluating and managing the low vision patient*

Text books:

1. *Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998*
2. *E Vaithilingam: practice of Low vision – A guide book, Medical Research Foundation, 2000.*
3. *A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007*

Semester I
Paper III: CLINICAL OPTICS

Unit 1

Review of Optics
Illumination, Transmission and Absorption of light, Laser Fundamentals, Pinhole Imaging, Image Magnification, photometry and Radiometry
Refraction and Reflection at Curved Surfaces, Fermat's Principle, Stigmatic Imaging of refracting Surface.
First Order Optics – Ignoring image quality, Paraxial Approximation, Small angle approximation. Lens Maker's Equation, Knapp's law, Lens Combinations, Afocal System, Transposition of Lens, Combining Cylinders at Oblique Axis

Unit 2

Optics of the Human Eye
The Development of Optical System of the Eye, The human Eye as Optical System, Schematic Eyes, Important Axes of the Eye, Pupil Size and its Effect on Visual Resolution, Visual Acuity, Contrast Sensitivity Functions, Color vision, Epidemiology of Refractive Error, Developmental Myopia, Developmental Hyperopia, Prevention of Refractive Errors.

Unit 3

Advanced Clinical Refraction
Spherical Correcting Lens and Far point concept, Cylindrical correcting lens and far point concept Astigmatic Dial, Crossed Cylinders, Effectively of Lens, Effect of Spectacle and Contact Lens on Accommodation and Convergence,
Refraction for pre verbal children, Prescribing for Children, Guidelines for prescribing Cylinders, Aphakic and Psudophakic Refraction, Special Retinoscopy
Refraction and Prescription in Anisometropia and Anisokonia, Special Lenses, Isokonic Lenses, Clinical Accommodative Problems, Dynamic Retinoscopy, AC/A Ratio

Unit 4

Intra Ocular Lenses
Types of IOL's – Anterior Chamber Lenses, Posterior Chamber Lenses
Optical Consideration of IOL's – Image Magnification, IOL power Selection, Piggyback IOL, IOL power after Refractive Surgery.
Lens Related Visual Disturbances, Non Spherical Optics, IOL Standards
Multifocal IOL's – Types of Multifocal IOLs, Clinical Result of Multifocal IOLs, Accommodating IOLs

Unit 5

Lens Power and Thickness Considerations
Positional Lens Power Problems, Effective Power as Related to vertex distance change. Vergence of light as it travels through a lens, vergence of light striking the second surface of a thick lens, Calculating front and back vertex powers
Lens Design – Aberrations, Spectacle lens design, Form of lenses, appropriate base curve, Manufacture's recommendations, factors that modify base curve choice,

Best form of lens, Aspheric Lens, Atoric Lens, Working with Aspheric and Atoric, Prescribing Guidelines of Multifocal Lens, Dispensing of Progressive Lens, Progressive lens troubleshooting

REFERENCES:

1. *Basic and Clinical Science Course-Clinical Optics – American Academy of Ophthalmology 2006-2007*

2. *System for Ophthalmic Dispensing: Clifford W Brooks, 3rd Edition, Butterworth Heinemann*

Semester I

Special Clinic 1 - LOW VISION CLINIC

1) *Low vision clinics*
2) *Evaluation of Low Vision*
3) *Management of different Low visions*
4) *Spastic children evaluation*
5) *Low vision screening camp*
6) *Integrated/Inclusive/Special school posting for a week period.*
7) *Case report – submitting and presentations*

Semester I

Elective Paper 1 : EYE BANKING

Unit I

Introduction to Eye Banking,
History & milestones,
Requirements in eye bank,

Unit II

Duties and responsibilities of eye bank personals, Indications and contra indications eye donation Instrumentation in eye banking

Unit III

Pre operative evaluation for collecting eye ball
Enucleation
Tissue retrieval, Handling of tissue, preservation techniques,

Unit IV

Evaluation techniques,
specular microscopy,

Unit V

Legal aspects in organ transplantation,
Types keratoplasties,
Advanced keratoplasties
Corneal prosthesis

Text Book:

1. *Dean Vavra: Eye Banking*
2. *Smolin and thoft,s :The Cornea Scintific foundation and clinical practice ,fourth edition*
3. *T.Bredehorn Mayr : Eye Banking ,Karger 2009*

Semester II

Paper IV: ORTHOPTICS AND VISION THERAPY

Unit I

Nonstrabismic Binocular Vision Anomalies, Convergence insufficiency, Convergence excess, Fusional vergence dysfunction. Functional Ocular Motor Dysfunction
Disorders of accommodation – Accommodative dysfunction

Unit II

Esodeviations – Infantile Esotropia, Accommodative Esotropia, Acute Aquired comitat Esotropia, Cyclic Esotropia, Microtropia, Divergence Insufficiency. Exodeviations – Exotropia of the divergence Excess type, Infantile/Congenital Exotropia, Sensory Strabismus, Consecutive Exotropia.
Mechanically restrictive strabismus, Duane Retraction Syndrome, Browns Syndrome, Thyroid – related Ophthalmopathy.

Unit III

Paralytic Strabismus – Unilateral Superior Oblique paresis, Abducens Nerve (CN VI) palsy, Ocular Motor Nerve (CN III), Abducens Nerve (CN VI) palsy, Ocular Motor Nerve (CN III).
Horizontal gaze disturbances – Internuclear Ophthalmoplegia and one and a half Syndrome, Congenital Ocular Motor Apraxia, Acquired ocular Motor Apraxia (Balint's Syndrome)
Vertical gaze disturbances – Vertical Gaze palsy (Steele – Richardson Olszewski Syndrome), Doprsal Midbrain Syndrome (Parinaud's Syndrome). ocular myasthenia gravis, amblyopia

Unit IV

Diagnostic techniques – Monocular / binocular Fixation Pattern, Bruckner Test, Maddox Rod Scale (Modified Thorington) Hirschberg / Krimsky test, step Vergence Testing, Vergence Facility, Monocular Estimation Method, Accommodative Facility, NSUCO Ocular Motor Test (The Maples), Developmental Eye movement test, parks Three- step test, Prism adaption test, Visuoscopy, four Base – out test, Cycloplegic Refraction, Delayed subjective Refraction, Double Maddox Rod.

Unit V

Primary care diagnosis and vision therapy for non-strabismus binocular vision disorders – three order binocular work up for near point, Non – Strabismic Binocular Vision Disorders, general Vision therapy program for the primary care Optometrist, Vision Therapy Techniques.

Text Book:

- *Erik M. Weissberg: Essentials of clinical binocular vision February 2004 Elsevier Health Sciences*
- *Scheiman, Mitchell and Wick, Bruce. Clinical Management of Binocular Vision. 2nd ed.Philadelphia: Lippincott, Williams & Wilkins, 2002.*
- *Griffin, John R. Binocular Anomalies: Diagnosis and Vision Therapy. 4th ed. Boston: Butterworth-Heinemann, 2002.*
- *VonNoorden, Gunter K. Binocular Vision and Ocular Motility: Theory and Management Of Strabismus. 6th ed. St. Louis: Mosby, 2001.*

Semester II

Paper V: CLINICAL OPTOMETRY - I

Unit I

Diseases of lids

Eye Lids – Blepheritis, External Hordeolum (Stye), Chalazion, Internal Hordeolum, Molluscum Contagious

Eye Lash Disorders – Tricihiasis, Psudotriechiasis, Distichiasis, Madarosis

Anomalies in the position of Lid Margins- Entropion, Ectropio, Symblepharon, Ankyloblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis

TUMOURS, INJURIES

Unit II

Diseases of orbit - PROPTOSIS, ENOPHTHALMOS, DEVELOPMENTAL ANOMALIES OF THE ORBIT, ORBITAL INFLAMMATIONS-Preseptal cellulitis, Orbital cellulitis and intraorbital abscess, Orbital mucormycosris, Orbital periostitis, Cavernous sinus thrombosis, Specific chronic orbital inflammations, Idiopathic orbital inflammatory disease

GRAVES' OPHTHALMOPATHY-Thyrotoxic exophthalmos, Thyrotropic exophthalmos ORBITAL TUMOURS, BLOW-OUT FRACTURES,

ORBITAL SURGERY – Orbitotomy, Exenteration

Unit III

Diseases of Lacrimal Apparatus – DACRYOCYSTITIS, Congenital, Chronic dacryocystitis, Acute dacryocystitis, Surgical technique of DCR and DCT

SWELLINGS OF THE LACRIMAL GLAN- Dacryoadenitis, Mickulicz's syndrome, Dacryopes, Tumours

Unit IV

Diseases of Conjunctiva

INFLAMMATIONS OF CONJUNCTIVA - Infective conjunctivitis, Bacterial, Chlamydial, Viral, Allergic conjunctivitis, Granulomatous conjunctivitis

DEGENERATIVE CONDITIONS – Pinguecula, Pterygium, Concretions

SYMPTOMATIC CONDITIONS – Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration
CYSTS AND TUMOURS, Cysts of conjunctiva, Tumours of conjunctiva

Unit V

Dry eyes
THE TEAR FILM THE
DRY EYE
Sjogren's syndrome
THE WATERING EYE - Etiology, Clinical evaluation

Text Book:

1. *Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990*
2. *Comprehensive Ophthalmology: AK Khurana 3rd Edition*

Semester II

Paper VI: ADVANCED CONTACT LENS – I

Unit I

History of contact lenses
Current concepts in anatomy and Physiology of the cornea and tear film
Microbiology and Immunology in relation to Contact Lens wear Vision and Optics with Contact Lenses
Corneal Topography measurement
Use of Slit Lamp in Contact Lens Practice

Unit II

Correlation of illumination with conditioning observed Pharmacology of Contact Lens solutions Review of Contact Lens solution contents
The effects of wear on Contact Lenses
Contact Lens wears in dry eye

Unit III

Soft Contact Lens EW complications Causes and management
Rigid vs permeable
EW complications: Clinical management
Keratoconus; Overview and contact lens fitting

Unit IV

Contact lens for children Contact Lenses for aphakics
Contact Lenses for Pseudo Aphakics
Contact Lenses in post refractive surgery/PRK

Unit V

Lens choice for astigmatism Soft
Contact Lens Design
R.G.P. Lens modification Contact
Lenses and Driving
Bandage Lenses-Assessment of deposits/micro organisms.

Text books:

- *IACLE modules 1 - 10*
- *CLAO Volumes 1, 2, 3*
- *Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006*
- *Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004*
- *E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008*

Semester II

Special Clinic 2 – GENERAL, CATARACT & CORNEA CLINIC

1. *General Evaluation and Work up*
2. *Anterior Segmen Evluation*
3. *Ocular Emergency Management*
4. *Applanation Tonometry*
5. *Gonioscopy*
6. *Fundus Evaluation using Direct Opthalmscope, Indrect Ophthalmoscope and Slitlamp*
7. *Posting in General Opthalmology, Cataract and Cornea Clinic one month each.*
8. *Case report – submitting and presentations*

Semester II

Elective Paper 2: FIRST AID

Unit I

Aims and Objectives of first Aid: Defenition, Objects, Principles, Responsibilities, Golden rules of first Aid, Kit of First Aider

Human Anatomy and physiology: Body Regions, Body Cavities, The central Nervous System, Abdonminal Quadrants, Body Systems, Circulatory System, respiratory System, Gastro Intestinal System, Urinary System, Nervous System, Hemopoitic System

First Aid during Emergency: Diagnosis, Blood Pressure, General Head to Toe Examination, Physical Examination

Resuscitation technique: Basic life Support, Breathing, Mouth to mouth Ventilation, Procedure of artificial Ventilation, Silvester Method

Recovery Position: Advantage Of recovery Position, How to Make Recovery Position.

Unit II

Haemorrhage or bleeding: Types of Haemorrage, Special Forms of Bleeding.

Shock: Effects of Shock, Causes of Shock, Factors influencing the Degree of Shock.

Wounds: Definition, Emergency care for Open wounds, Wound with foreign body, Special Wounds.

Dressing and Bandages: Types of Dressing, General Rules For Applying Dressings, General Rules

For Applying Bandages.
Sling
Fractures: Causes of Fractures, Types of Fractures, Classification of Fractures, Skull Fractures, Jaw and Facial Fractures, Upper Trunk and Limbs, Lower Trunk and Limbs.

Unit III

Emergencies:
Medical Emergencies: respiratory Emergencies, Asphyxia, Drowning, Suffocation, Strangulation, Throttling, Hanging, smoke Inhalation, Suffocation by Poisonous Gases, Cardiovascular Emergencies, Heat Attacks, Angina Pectoris, Congestive Heart Failure, Emergencies of Nervous system, Unconscious Patient, Infantile convulsions, Epilepsy, Status Epilepticus, Hysteria, Diabetic Emergencies, Insulin Shock and Diabetic Coma, Liver emergency, Kidney Emergency.
Poisoning: Routes of Taking Poisons, General symptoms and Sings, Acid Poisoning, Alkali Poisoning, Drugs, common Plant Poisoning, Metal Poisoning, organic Chemical Poisoning
Anaphylactic Shock (severe allergic reaction): insect Bites, Scorpion Bites, Sting of Mites, Ticks and Leeches, Snake Bite, Dog Bite.
Road accidents,
Effect of temperature: Sun Burn, Snow Blindness and Welder's Flash, Hypothermia, Frost Bite, Trench Foot, chilblain, Heat Exhaustion, Heat Stroke
Surgical Emergencies: Ligaments, First Aid in Muscle Injury, First Aid in Joint Injury
Injuries: Head Injuries, Chest Injuries, Abdominal Wound, Blast Injuries, Crush Injury, Burns and Scalds, electrical injuries, First Aid in Foreign Bodies.
Handling and transportation: General Principles, Aim to Transport, Lifting casualty, Lifting a casualty in a Wheel Chair, stretchers.

Unit IV

Common Ailments : Headache, Migraine, Earache, Toothache, Common cold and cough, Neck ache, Backache, Pain in Abdomen, Diarrhoea and Dysentry, Travel Sickness.

Unit V

Miscellaneous: Antiseptics, Sterilisation, Violent Patient, Suicidal Patient, Sexual Assault, Alcoholic Hallucination, Drug Abuse, Smoking, Miscarriage, Emergency Childbirth, Immunization Schedule, Cancer, Sings of Death.
Food and Nutrition: Proteins, Fats, Carbohydrates, Calories, Vitamins and Minerals, Phosphorus, Iron, Sodium Chloride, Zinc, Copper, Cobalt, Water, Fuel Value of Food, Balanced Diet
Ambulance service in disaster;
Sports injuries: Knee, Jumper's Knee, Osgood-Schlatter's Syndrome, Bursitis, Shin Pain, Tennis Leg, Achilles Tendinitis, Retrocalaneal Pain, Plantar Fascitis, Blisters, Athlete's Foot, Frozen Shoulder, Tennis Elbow, Wrist Pain in Gymnasts, Finger endon Injury, Eye injuries, Dental Injuries, Ear Injuries, Under water Diving Injury, Maxillofacial Injuries, Nasal Injuries, Ultrasonic, Faradic Stimulation, Manual Therapy, Traetment Modalities of Sports Injuries.

Text Book:

1. *L.C. Gupta, Abhitabh Gupta: Manual of First Aid, Jaypee*
Savitri Ramaiah: First Aid: Health
Solutions Sterling Publishers Pvt Ltd
(September 19, 2012

Semester III

PAPER VII: CLINICAL OPTOMETRY – II

Unit-I

CATARACT - Congenital and developmental cataract, Acquired cataract, Management of cataract

SURGICAL TECHNIQUES FOR CATARACT EXTRACTION, Intracapsular cataract extraction, Conventional extracapsular cataract

Extraction, Manual small incision cataract surgery, Phacoemulsification, Surgical techniques of extracapsular cataract extraction for childhood cataract, Intraocular lens implantation, Complications of cataract surgery and their management

DISPLACEMENTS OF THE LENS-Subluxation, Dislocation

CONGENITAL ANOMALIES OF THE LENS

Unit-II

Cornea - CONGENITAL ANOMALIES

INFLAMMATIONS OF THE CORNEA-Ulcerative keratitis, Non-ulcerative keratitis, Superficial, Deep

CORNEAL DEGENERATIONS-Age-related corneal degenerations, Pathological corneal degenerations

CORNEAL DYSTROPHIES-Anterior dystrophies, Stromal dystrophies, Posterior dystrophies

Ectatic conditions of cornea- Keratoconus, Keratoglobus, Keratoconus posterior

ABNORMALITIES OF CORNEAL TRANSPARENCY - Corneal edema, Corneal opacity, Corneal vascularisation

KERATOPLASTY

Unit-III

INFLAMMATIONS OF THE SCLERA

Episcleritis, Scleriti, Anterior, Posterior

BLUE SCLERA

STAPHYLOMAS – Anterior, Intercalary

Ciliary-Equatorial, Posterior

Unit-IV

CONGENITAL ANOMALIES

INFLAMMATIONS (UVEITIS)-General considerations, Anterior uveitis, Posterior uveitis, Endophthalmitis and Panophthalmitis, Specific clinico-etiological types of uveitis

DEGENERATIVE CONDITION - of iris, of choroid

TUMOUR - of choroid, of ciliary body, of iris

Unit-V

BINOCULAR SINGLE VISION

STRABISMUS - Definition and classification, Evaluation of a case, Pseudostrabismus, Heterophoria, Heterotropia, Concomitant strabismus, Incomitant strabismus, Strabismus surgery

NYSTAGMUS- Physiological, Sensory deprivation, Motor imbalance

Text Books:

a. *Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990*
b. Comprehensive Ophthalmology: AK Khurana 3rd Edition

Semester III

Paper VIII: ADVANCED CONTACT LENS – II

Unit I

Appearance of Contact Lenses
Pre and Post cleaning
Calculation of DK/L
EOP and oedema
Measurements of corneal swelling with the Phachometer

Unit II

Measurement of the Oxygen needs of the eye or needs and contact lens transmissibility
The effect of materials and deposits of DK/L
Silicone hydrogel contact lenses
The effect of hypoxia on corneal structure

Unit III

Soft wearing schedules DW Vs EW
Bifocal Contact Lens fitting and assessment
Toric SCL Lenses
Toric RGP Lenses
Therapeutic contact lenses & maintenances

Unit IV

Advancements in Contact Lens instrumentation and techniques Visual recognition of conditions and problem solving
Corneal prosthesis
Special applications of Contact Lens in Research and Industry
Occupation Vs Contact lenses

Unit V

Future trends in industry, R & D and marketing for Contact Lenses and associated product
Vision correction by refractive surgery, Ortho teratology & reverse geometrical contact lenses etc
Scleral fitting contact lenses
Advanced study of Contact Lens research methods and analysis of Contact Lens literature and data basis.

Text books:

- *IACLE modules 1 - 10*
- *CLAO Volumes 1, 2, 3*
- *Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006*
- *Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004*
- *E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008*

Semester III

Paper IX: ADVANCED GLAUCOMA-I

Unit-I

Cellular and Molecular Biology of Aqueous Humor Dynamics
Biology of Aqueos humar inflow- Cellular organization of ciliary body and ciliary process, Ciliary body muscles, ciliary body vessels, ciliary processes, Innervation of ciliary body
Mechanism and regulations of aqueous humar production, Function and composition of Aqueos humar
Aqueos humar outflow- Trabecular pathway and Uveoscleral pathway

Unit-II

Intra Ocular Pressure and Tonometry
Intra Ocular Pressure, Introduction, Factors affecting, Physiology
Tonometers and Tonometry – Classification of tonometers, Indentation, Applanation, Non Contact, Miscellaneous tonometers, Comparison of Tonometers.
Tonometry for Special Clinical Circumstances – Tonometry over contact lens, tonometry with gas filled eyes, Tonometry Flat Anterior Chamber, Tonometry in eyes with Keratoprosthesis,

Unit-III

Gonioscopy and Other Techniques - Historical Background, Principle of Gonioscopy, Direct and Indirect Gonioscopy.
Gonioscopic Appearance of normal Anterior Chamber, Recording Gonioscopic Finding.
Cycloscopy – High resolution ultrasound bio microscope, Optical Coherence Topography of the anterior segment.
Aques humar dynamics, Fluorophotometry, Tonography, Measurement of episcleral venous pressure.

Unit-IV

Optic Nerve, Retina and Choroid
Anatomy and histology, Embryology of Retina and Optic Nerve.
Pathophysiology of glaucomatous optic nerve damage, Clinical Appearance of Optic Nerve head, Glaoucomatous optic atrophy, Advanced glaucomatous cupping, Peripappillary changes associated with Glaucomatous Optic Atrophy, Differential Diagnosis of Glaucomatous optic atrophy.

Evaluation echnics – Office evaluation and recording, Photographic Technique, Ultrasonography.

Unit-V

Classification of Glaucomas
Classification Based on Etiology - Stages of Glaucoma, Chronic Open angle glaucoma, puppillary Block Glaucoma, Developmental Anomalies of the anterior chamber
Classification based on Mechanism – Open Angle Closed Angle, Developmental Anomalies of the anterior chamber

Text BooK

a) *Schield's : Text book of glaucoma , Karim F. Damji, Sharon Freedman, Sayoko E. Moroi and Douglas J. Rhee MD Sixth edition (Nov 1, 2010)*

Becker Shaffer's: Diagnosis and Therapy of the Glaucoma
, Mosby; 8 edition ,18 June 2009

Semester III

Special Clinic 3 – CONTACT LENS CLINIC

1) *Rigid Contact lens fitting in Simple refractive errors*
2) *Soft contact lens fitting in Simple Refractive errors*
3) *Bifocal fitting*
4) *Scleral contact lens fitting*
5) *Orthokeratology*
6) *Postrefractive surgery*
7) *Postkeratoplasty fitting*
8) *Abnormal cornea*
9) *Cosmetic contact lens*
10) *Bandage lens fitting*

Case report – submitting and presentations

Semester III

Elective Paper III: COMMUNITY OPTOMETRY

Unit: I

Public Health Optometry: Concepts and implementation
Dimensions, determinants and indicators of health
Levels of disease prevention and levels of health care patterns

Unit: II

Epidemiology of blindness – Defining blindness and visual impairment
Eye in primary health care
Contrasting between Clinical and community health programs

Unit: III

Community Eye Care Programs
Community based rehabilitation programs
Nutritional Blindness with reference to Vitamin A deficiency

Vision 2020: The Right to Sight

Unit: IV

Screening for eye diseases
National and International health agencies, NPCB
Role of an optometrist in Public Health
Organization and Management of Eye Care Programs – Service Delivery models
Health manpower and planning & Health Economics

Unit: V

Evaluation and assessment of health programmes
Optometrists role in school eye health programmes
Basics of Tele Optometry and its application in Public Health
Information, Education and Communication for Eye Care programs

Text books:

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

Semester IV

Paper X: CLINICAL OPTOMETRY-III

Unit-I

Disease of Retina-

CONGENITAL AND DEVELOPMENTAL DISORDERS
TRAUMATIC LESIONS
INFLAMMATORY DISORDERS- Retinitis, Periphlebitis retinae
VASCULAR DISORDERS- Retinal artery occlusions, Retinal vein occlusions, Diabetic retinopathy, Hypertensive retinopathy, Sickle cell retinopathy, Retinopathy of prematurity, Retinal telengiectasias, Ocular ischaemic syndrome
DYSTROPHIES AND DEGENERATIONS
MACULAR DISORDERS
RETINAL DETACHMENT
TUMOURS

Unit II

VITREOUS LIQUEFACTION
VITREOUS DETACHMENT
VITREOUS OPACITIES – Developmental, Inflammatory, With liquefaction, Amyloid degeneration, Asteroid hyalosis, Synchysis scintillans, Red cell opacities, Tumour cell opacities
VITREOUS HAEMORRHAGE
VITRECTOMY-Open sky vitrectomy, Pars plana vitrectomy, Vitreous substitutes

Unit III

Disease of Optic nerve,
LESIONS OF THE VISUAL PATHWAY
PUPILLARY REFLEXES AND THEIR
ABNORMALITIES

DISEASES OF THE OPTIC NERVE-Congenital anomalies, Optic neuritis, Anterior ischaemic optic neuropathy, Papilloedema, Optic atrophy, Tumors
SYMPTOMATIC DISTURBANCES OF VISION-Night blindness, Day blindness, Color blindness, Amaurosis, Amblyopia, Cortical blindness, Malingering, Hysterical blindness, Disorders of higher visual functions
OCULAR MANIFESTATIONS OF DISEASES OF CENTRAL NERVOUS SYSTEM
Infections, Aneurysms, Intracranial hemorrhages, Demyelinating diseases, Head injury

Unit IV

OCULAR THERAPEUTICS-Modes of administration, Antibacterial agents, Antiviral drugs, Ocular antifungal agents, Mydriatics and cycloplegics, Antiglaucoma drugs, Corticosteroids, Nonsteroidal anti-inflammatory drugs, Viscoelastic substances
LASERS-Production of laser beam, Mechanisms of laser effects and their therapeutic applications
CRYOTHERAPY IN OPHTHALMOLOGY-Principle, Mode of action, Uses

Unit V

OCULAR MANIFESTATIONS OF SYSTEMIC DISEASES-Introduction, Nutritional deficiencies, Xerophthalmia, Systemic infections, metabolic disorders, Disorders of skin and mucous membranes, Haematological diseases
OCULAR ABNORMALITIES IN TRISOMIES
ADVERSE OCULAR EFFECTS OF
COMMON SYSTEMIC DRUGS

Text Books:

1. *Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990*
2. *Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007*
3. Comprehensive Ophthalmology: AK Khurana 3rd Edition
4.

Semester IV

Paper XI: OPHTHALMIC IMAGING

Principle, Instrumentation, Illumination Techniques, Special Procedures, Uses for the following.

Unit I

Hardware , Software in Ophthalmic Imaging,
External photography of the eye,
Macro photography,
Corneal Topography,
pentacam,
Aberrometry.

Unit II

Slit lamp,
OCT,
HRT.

Unit III

Photograph of the angle of anterior chamber,
Ophthalmic Ultrasound,
GDx,
Ultra Sonography,
Confocal Microscopy,

Unit IV

Fundus photography by conventional and infrared imaging systems,
Pan funduscopic Lenses,
Indirect, Direct Ophthalmoscope,
Fluoresce in photography,
Mydriatic and non mydriatic fundus cameras.

Unit V

Computerized tomography,
Magnetic Resonance Imaging,
Methods of image enhancement,
Advance Ophthalmic Imaging – Glaucoma, Retina.

Text Book:

1. *James Wolffsohn : Eye Essentials Ophthalmic Imaging , James Wolffsohn BSc PhD MCOptom, Sandip Doshi PhD MCOptom and William Harvey MCOptom (27 March 2008)*
2. *Roger Steinert MD, David Huang : Anterior Segment Optical Coherence Tomography Roger Steinert MD and David Huang MD PhD (Jan 4, 2008)*
3. *Mark Brezinski,: Optical Coherence Tomography: Principles and Applications (25 August 2006)*
4. *Wavefront analysis aberrometers and corneal topography Benjamin F. Boyd Amar Agarwal Jorge Alio Ronald Krueger Steven E. Wilson*
5. *Arun D.sing :Ophthalmologic Ultrasound, An Issue of Ultrasound Clinics,vol 3*

Semester IV

Paper XII: ADVANCED GLAUCOMA-II

Unit-I

Assessment of Visual Field
Normal Visual Field, Visual field loss in glaucoma.
Advanced Glaucomatous field defects, Visual field changes in normal tension glaucoma, Correlation between optic nerve head and visual field defects.
Basic Principles of Visual Field Testing, Techniques and instruments for measuring the field of vision, HFA, Interpreting the results and analyzing the progression, Glaucoma hemi filed test, Other types of Perimetry, Manual Perimetry.
Glaucomatos influence on Visual Field

Unit-II

Normal Tension Glaucoma – Terminology, Epedemiology, Clinical Dofferences between NTG and COAG, Differentional diagnosis of NTG,
Mechanism of COAG, Mechanism of Obstruction and aques outflow, Influence of Aqueos humar, Alteration of the trebicular meshwork, Stress respons markers, Cortico steroid sensitivity, Relationship of Intra Ocular pressure and Cortico Steroid sensitivity
Mechanism of Optic Nuropathy, Management of NTG

Unit-III

Pupillary Block Glaucoma
Primary Vs secondary angle closure glaucoma, Acute, Sub acute and Chronic ACG
Clinical Features and findings, Newer techniques, Clinical findings during and Acute attack.
Theories of Mechanism – Relative puppillary block, Anatomical Factor, Significance of papillary dialatation, Chronic angle closure glaucoma, Plateau Iris.
Differential Diagnosis, Management

Unit-IV

Childhood Glaucoma – Classifications, Signs and symptoms of Glaucoma in Childhood, Differential Diagnosis, Diagnostic Examinations
Childhood glaucoma Clinical Presentation, Primary Congenital Glaucoma, Etiology, Features and Management
Developmental Glaucoma – Classifications and Features
Other Syndroms associated with Glaucoma.
Exofoliation Syndrom and Exofoliative Glaoucoma
Pgmentary Glaucoma, Steroid Induced Glaucoma

Unit-V

Principle of Medical therapy and Management
Gathering ivedences to evaluate the patient, Approch to the patient with glaucoma, Treatment Plan, Establishing the target pressure, Pharmokinetics.
Glaucoma medications – Prostaglandins, beta blockers, Carbonic Anhydrase inhibitaros, Miotic Agents.

Principles of Laser Surgery for Glaucoma – Basic principles of Laser, Laser induced tissue interations, Specific lasers for glaucoma surgery
Filtering surgery – Mechanisms of filtering action, Basics techniques of filtering surgery, Trebeculactomy

Text BooK

1. *Schield's : Text book of glaucoma , Karim F. Damji, Sharon Freedman, Sayoko E. Moroi and Douglas J. Rhee MD Sixth edition (Nov 1, 2010)*

Becker Shaffer's: Diagnosis and Therapy of the Glaucoma ,
Mosby; 8 edition ,18 June 2009

Semester- IV
Special Clinic 4 – Retina & Vitreous Clinic

1) *Retina evaluation using indirect ophthalmoscope*
2) *Retinal Imaging*
3) *Fundus Fluorescein Angiography*
4) *B Scan evaluation*
5) *Tomogram Evaluation*
6) *Posting in Retina clinic*
7) *Case report – submitting and presentations*

Semester- IV
Elective IV - Refractive Surgeries

Unit I

Corneal Layers and Shape to the optics of eye
Computerized Cornea l Topography:
Axial Power and Curvature, Instantaneous Power and Curvature, Mean Curvature, Indications For Corneal Topography In Refractive Surgery, Corneal Topography and irregular Astigmatism, Limitations of Corneal Topography, Clinical Situation illustrating the role of corneal topography in refractive Surgery,
Wave Front Analysis:
Wave Front Analysis and Irregular Astigmatism, Fermat's Principle and Wave Front Analysis, Measurement of Wavefront Aberrations and Graphical Representations, Lower -Order aberrations, higher order Aberrations.
Biomechanics of the Cornea Effects of
KeratoRefractive surgery Corneal
Wound Healing
Laser Biophysics, Laser-Tissue interactions, Types of photo ablating Lasers, Wavefront-Guided Laser Ablation.

Unit II

Patient Evaluation: Preoperative Evaluation, Patient Expectations, Social History, Medical History,

Pertinent Ocular History, Patient Age, Presbyopia, Monovision
Examination, Uncorrected Visual Acuity and Manifest and Cycloplegic, Refraction Acuity, Pupillary Examination, Ocular Motility, Confrontation Fields and Ocular Anatomy, Intra Ocular Pressure, Slit Lamp Examination, Dilated Fundus Examination
Ancillary Test, Corneal Topography, Pachymetry, Wavefront Analysis,

Unit III
Specific Procedures In refractive Surgery:
Radial Keratotomy, Patient Selection, Complications, Hexagonal Keratotomy, Incisional Correction of Astigmatism, Transverse Keratotomy, Arcuate keratotomy and Limbal Relaxing incisions,Complication
Keratophakia, Homoplastic corneal inlays, Alloplastic Corneal Inlays
Epikeratoplasty, Patient Selection, Complication, Alloplastic Corneal Onlays
Intrastromal Corneal ring segment, Patient Selection, Complication, Other Potential uses For Intrastromal Corneal Ring Segments
Orthokeratology

Unit IV
Photorefractive keratectomy (PRK) and laser Sub epithelial Keratomileusis (LASEK), Complication, Patient selection.
Laser in Situ Kertomileusis (Lasik), Complication, Patient Selection
Wavefront-Guided PRK and LASIK, Pre operative preparationThermokeratoplasty, History, Laser Thermokeratoplasty,
Conductive Keratoplasty, Patient Selection
Phakic IOL, Advantages, Disadvantages, Patient Selection, Complication Bioptics
Clear lens Extraction (Refractive Lens Exchange): Patient Selection, Surgical Planning, IOL calculation in Refractive Lensectomy, Complications, Advantages, Disadvantages
Toric IOL, Instrumentation, Patient Selection, Planning and Surgical technique, Complications
Multifocal IOL, Patient Selection, Side Effects and Complications
Accommodative IOL, Light-Adjustable IOL
Accommodative and Non-Accommodative treatment of Presbyopia:
Theories of Accommodation
Non Accommodative Treatment of Presbyopia: Monovision, Conductive Keratoplasty, IOL Implants, Custom or Multifocal Ablation, Corneal Inlays
Accommodative Treatment of Presbyopia, Scleral Surgery, Other IOL Innovations on the Horizon

Unit V
Refractive Surgery in Ocular and Systemic Disease: Introduction
Ocular Conditions: Dry eye, Herpesvirus, Keratoconus, Post-Penetrating Keratoplasty, Ocular Hypertension and Glaucoma, Retinal disease, Amblyopia and Strabismus in the Adult and Child
Systemic Condition, Humen Immunodeficiency Virus, Diabetes Mellitus, Connective Tissue Disease
IOL calculation after Refractive Surgery, With Pre-Refractive Surgery Refraction and Keratometry and Post-Refractive Surgery Refraction, With pre-Refractive Surgery Refraction and Keratometry, With Pre-refractive surgery Refraction and Post-Refractive Surgery refraction, With Pre-refractive surgery Refraction only , With no pre-operative Information Retinal Detachment repair after LASIK, Corneal Transplantation after Refractive Surgery Contact Lens Use after Refractive Surgery: Indications, General Principles, and Contact Lenses after RK, Contact lens

fitting after PRk, Contact Lens Fitting after LASIK, contact Lens assisted, pharmacologically induced Keratosteepening (CLAPIKS)
Glaucoma after refractive Surgery

Text Book:

1. *Refractive Surgery: AAO – Section 13*

2. *Wavefront analysis aberrometers and corneal topography Benjamin F. Boyd, Amar Agarwal, Jorge Alio and Ronald Krueger (Mar 25, 2003)*

Ming Wang:Corneal Topography in the Wavefront Era and Guide for Clinical Application, Second edition