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Dr. S. Krishnaveni
Professor
Chairperson, BOS

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

Proceedings of the Meeting of the Board of Studies in B.Sc. (Hons.) (Optometry and Eye care) (Under Graduate) Specialized Programme offered by Malabar College of Optometry, Nanjanagud held on 19-05-2025 at 12:00 P.M

Members Present :

1. Prof. Krishnaveni	Chairperson
2. Prof. K.P Jayachandran	Member
3. Sri. Syamlal	Member
4. Smt. Lakshmipriya.P	Member
5. Smt. Anjali.K.P	Member
6. Smt. Sneha.M.P	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. Modification made in existing LTP of **B.Sc. (Honos.) (Optometry and Eye Care)** programme. as per NEP.

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

Prof. S. Krishnaveni

Chairperson

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

Bachelor of Honour's
(Optometry and Eye Care)

As per NEP Regulations

To be implemented from the Academic year 2023-24

Proposed Scheme & syllabus for B.Sc. (Hon's) (Optometry and Eye Care)

As per NEP 2020 regulations

I. OBJECTIVES:

B.Sc.(Hons.)(Optometry and Eye Care) 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 subject of study Syllabus is implemented as per National –Education Policy (NEP)

III. DURATION OF THE PROGRAM:

The **B.Sc.(Hons.)(Optometry and Eye Care)** course is a four-year graduate course usually divided into eight semesters. Students have an internship of 1 year for clinical internship training and practice in reputed eye hospitals.

The NEP 2020 provides multiple exit options for students as specified below.

EXIT OPTIONS:

1. The students who successfully complete one year or two semesters and leave the program will be awarded certificate in Optometry and Eye Care.
2. The students who successfully complete 2 years or 4 semesters and leave the program will be awarded diploma in Optometry and Eye Care.
3. Students who successfully complete 3 years or 6 semesters and leave the Program will be awarded B.Sc.(Optometry and Eye Care)
4. An option is given to the students to continue their education to the fourth year and those who successfully complete 4 years or 8 semesters will be awarded B.Sc.(Hons.)(Optometry and Eye Care)

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 honours courses including languages constitution of India and environmental studies health wellness social and emotional learning/ sports/ NCC/ NSS 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 60 marks for DSC /DSE/Vocational / SEC and OEC.
b. Internal assessment 40 marks for DSC /DSE /Vocational / SEC and OEC.

Guidelines for continuous internal evaluation and semester end examination

The CIE and SEE will carry 40% and 60% 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)	20
2	Internal Assessment Test (IAT) (B)	20
	Total of CIE(A+B)	40
3	Semester End Examinations (SEE)-(C)	60
	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 20% weightage (20 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 5 marks each (4X5=20)

i. Individual assignment
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 20% weightage (20 Marks) of total marks of a course. Under this component, two test will have to be conducted in a semester for 40marks 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 60 marks.

PATTERN OF QUESTION PAPER

Time: 3 Hours Marks: 60

Answer the following questions. (15 Marks) (15X4=60)

1.....

2.....

OR

3. . .....

4. . .....

5. . .....

6. . .....

OR

7. . .....

8. .....

9. .....

10. . .....

OR

11. . .....

12. .....

13. .....

14. . .....

OR

15. . .....

16.....

Minimum Marks for a Pass:

Candidates who have obtained a minimum of 35% marks in semester end examination i.e, 21 marks out of 60 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.

Proposed Scheme of Teaching Evaluation for B.Sc.(Hons.)(Optometry and Eye Care)

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	First Language - Paper 1	AECC - 101	3+0+0	60	40	100	3
2	Second Language: English Paper 1	AECC - 102	3+0+0	60	40	100	3
3	Core 1 : Anatomy & Physiology	DSC 101	3+1+0	60	40	100	3
4	Core 2 : Physical Optics	DSC 102	3+0+0	60	40	100	3
5	Complementary Paper 1: Bio Chemistry	DSC 103	3+2+0	60	40	100	4
6	Human Rights	SEC VB	2+0+0	25	25	50	2
7	Sports/cultural	SEC VB	0+0+4	25	25	50	2
	Total Credits			**350**	**250**	**600**	**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	First Language - Paper 2	AECC - 201	3+0+0	60	40	100	3
2	Second Language : English Paper 2	AECC - 202	3+0+0	60	40	100	3
3	Core 3 : Anatomy & Physiology of the Eye	DSC 201	3+1+0	60	40	100	3
4	Core 4 : Geometrical Optics	DSC 202	4+0+0	60	40	100	4
5	Complementary Paper 2: Microbiology	DSC 203	3+2+0	60	40	100	4
6	Women's Rights	SEC VB	2+0+0	25	25	50	2
7	Practical 1 : Physical & Geometrical Optics	OPT P201	0+0+8	50	50	100	4
8	Sports/Cultural	SEC VB	0+0+4	25	25	50	2
	Total Credits			**400**	**300**	**700**	**25**

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	First Language - Paper 3	AECC- 301	3+0+0	60	40	100	3
2	Second Language : Communicative English 1	AECC- 302	3+0+0	60	40	100	3
3	Core 5 : Optometric Optics	DSC 301	3+0+0	60	40	100	3
4	Core 6: Visual Optics 1	DSC 302	3+0+0	60	40	100	3
5	Core 7: Optometric and Eye Care Instruments	DSC 303	3+2+0	60	40	100	4
6	Complementary Paper 3 : Pharmacology	DSC 304	3+0+0	60	40	100	3
7	Eye Care	OEC	3+0+0	60	40	100	**3**
	Total Credits			**420**	**280**	**700**	**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	First Language - Paper 4	AECC - 401	3+0+0	60	40	100	3
2	Second Language : Communicative English 2	AECC - 402	3+0+0	60	40	100	3
3	Core 8: Visual Optics 2	DSC 401	3+0+0	60	40	100	3
4	Core 9 : Dispensing Optics	DSC 402	3+0+0	60	40	100	3
5	Core 10 : Systemic Disease	DSC 403	3+0+0	60	40	100	3
6	Complementary Paper 4 : Pathology	DSC 404	3+0+0	60	40	100	3
7	Eye Care in Sports	OEC	3+0+0	60	40	100	3
8	Practical 2: Clinical Optometry and Eye Care 1	OPT P401	0+0+8	50	50	100	4
	Total Credits			**470**	**330**	**800**	**25**

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	60	40	100	4
2	Core 12 : Ocular Disease 1	DSC 502	3+2+0	60	40	100	4
3	Core 13 : Binocular Vision 1	DSC 503	3+2+0	60	40	100	4
4	Core 14 : Low Vision and Eye Care	DSC 504	3+2+0	60	40	100	4
5	Core 15 : Occupational Optometry	DSC 505	3+0+0	60	40	100	3
6	Elective Paper 1 : Community Optometry	OEC 1	3+0+0	60	40	100	3
	Total Credits			**360**	**240**	**600**	**22**

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	60	40	100	4
2	Core 17 : Ocular Disease 2	DSC 602	3+2+0	60	40	100	4
3	Core 18 : Binocular Vision 2	DSC 603	3+2+0	60	40	100	4
4	Core 19 : Geriatric & Pediatric Eye Care	DSC 604	3+0+0	60	40	100	3
5	Elective Paper 2 : Nutrition	OEC 2	3+0+0	60	40	100	3
6	Practical 3 : Clinical Optometry and Eye Care 2	OPT P601	0+0+8	60	40	100	4
7	Project	OPT PJ 601	0+0+8	60	40	100	4
	Total Credits			**420**	**280**	**700**	**26**

Year 4 - Semester VII							
Sl. NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Core 20 : Special Clinic 1	DSC 701	0+0+20	100	150	250	10
2	Core 21: Special Clinic 2	DSC 702	0+0+20	100	150	250	10
	Total Credits			**200**	**300**	**500**	**20**

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 Clinic 3	DSC 801	0+0+20	100	150	250	10
2	Core 23: Special Clinic 4	DSC 802	0+0+20	100	150	250	10
	Total Credits			**200**	**300**	**500**	**20**

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.

Acronyms Expanded

AECC	: Ability Enhancement Compulsory Course
DSC	: Discipline Specific Course
SEC	: Skill Enhancement Course
SB/VBOEC	: Skill Based/ Value Based Open Elective Course
DSE	: Discipline Specific Elective
SEE	: Semester End Examination
CIE	: Continuous Internal Evaluation
L+T+P	: Lecture+Tutorial+Practical(s)

SEMESTER 1

CORE PAPER I - ANATOMY & PHYSIOLOGY

Course Description: General anatomy deals with the entire human anatomy with emphasis ondifferent 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

SEMESTER I

CORE PAPER II – PHYSICAL OPTICS

Course Description: This course will be taught in one semester. Physical Optics is the studyof 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 ofproperties 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 knowledgeand 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
2. 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 cranialnerves 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 illusVisual 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 – GEOMETRIC OPTICS

Course Description: Geometric Optics is the study of light and its behavior as it propagates in avariety 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 ofmirrors 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 Geometric 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 pathogeniccharacteristics 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: IV

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 – GEOMETRIC & PHYSICAL 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 lensesand 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 andthereby 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 basicprinciple, description and usage in clinical practice. Also it covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuroophthalmic examination, pediatric optometry examination, and Glaucoma evaluation.

Course Objectives: Upon completion of the course, the student ,should be able to gaintheoretical 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-OpticalInstrumentation, 2002
2. **G Smith,D A. Atchison:**The Eye and Visual Optical Instruments, CambridgeUniversity Press, 1997
3. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
4. D B. Elliott :ClinicalProcedures in Primary Eye Care,3rdedition, Butterworth-Heinemann, 2007
5. Jack J. Kanski ClinicalOphthalmology: A Systematic Approach,6thedition, 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 ,3rdedition,McGraw-Hill Medical, 2003

SEMESTER III

COMPLEMENTARY PAPER III – PHARMACOLOGY

Course Description: This course covers the actions, uses, adverse effects and mode ofadministration 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:

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

SEMESTER III

EYE CARE

UNIT- I

- Visual performance and screening:visual capabilities,Light perception &visual adaptation

- visibility of tasks

-Advantages of industry of vision screening

- Methods of vision screening

UNIT -2

- Ocular injuries and Management: Incidence of ocular injuries &their prevention.

- Mechanical ocular injuries:contusion,perforating injuries.

- Non mechanical ocular injuries :chemical, thermal, electrical &Radiational injury.

UNIT -3

-Construction of Eye care protectors: lens materials,Testing procedures of protective lenses, materials for lens housing.

-Regulations&standards relating to eyeprotection;protection of eyes regulations, British standards

UNIT -4

- Lamps& Lightings; concepts &units, light sources, Recommended levels of illuminance,Lighting system management.

UNIT -5

- Visual display units; Asthenopia, Dermatitis,Epilepsy,Radiation

-Regulations regarding the use of visual display unit

-Driving; relationship between visual function &driving performance

-Visual standards for driving licenses.

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 andthereby 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

Unit: V

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:

A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
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 andframes 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 B1,B2, 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 tospecific entities relevant in optometry/ophthalmology.

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

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:

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 IV

EYE CARE IN SPORTS

Unit I

Introduction to Sports Vision
Sports and Vision, Visual Task Analysis in Sports, Visual Information Processing In Sports, Visual Performance Evaluation

Unit II

Sports Vision Screening and Report Strategies
Ocular Injuries in Sports: Assessment and Management, Enhancement of Visual skills in Sports, Visual Needs in Tennis, Visual Needs in Table Tennis
Visual Needs in Badminton

Unit III

Visual Needs in Cricket, Visual Needs in Baseball, Visual Needs in Golf, Visual Needs in Hockey, Visual Needs in Basketball

Unit IV

Visual Needs in Volleyball, Visual Needs in Football, Visual Needs in Judo, Visual Needs in Wrestling, Visual Needs in Boxing, Visual Needs in Yachting

Visual Needs in Scuba-diving

Unit V

Visual Needs in Swimming, Visual Needs in Rifle Shooting, Visual Needs in Clay Pigeon Shooting, Visual Needs in Archery, Visual Needs in Chess, Visual Needs in Snooker, Visual Needs in Motor car Racing, Visual Needs in Downhill Skilling

Text Books:

Rachel V. North: Work and the eye, Second edition Butterworth-Heinemann, 2001
Graham B. Erickson: Sports vision: vision care for the enhancement of sports performance , Elsevier Health Sciences, 2007
Ajay Kumar Bhootra, Sumitra: Elite Sports and Vision Jaypee Brothers Publishers, 01-Oct-2008

SEMESTER V
CORE PAPER XI– CONTACT LENS I

Course Description: The subject provides the student with suitable knowledge both intheoretical 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:

IACLE modules 1 - 10
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 :Clinicalmanual 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 ofthe 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

3.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)

c) **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)
5.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:

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

Reference Books:

Stephen J. Miller :Parsons Diseases of the Eye, 18thedition, ChurchillLivingstone, 1990
Jack J. Kanski ClinicalOphthalmology: A Systematic Approach, 6thedition,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, epidemiologyaspect 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 thefollowing:
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
Vision impairment ,its functional implications and management

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:Evaluation,Early intervention and management of vision impairment in infants and children

Unit: IV
Low vision aids – dispensing & prescribing aspects
Visual rehabilitation & counseling
Educational aspects of vision impaired persons
Legal aspects of Low vision in India

Unit: V
Case Analysis:
Clinicians evaluation form
Prescription form

Text books:

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

Reference Books:

Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
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, Visualdemand 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 thefollowing 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 I
Occupational hazards and preventive/protective methods
Task Analysis
Ocular injuries:incidence,types,and management of injuries

Unit: IV
Industrial Vision Screening – Modified clinical method and Industrial Vision test Vision Standards – Railways, Roadways, Airlines
Constructions of eye protectors:Materials and procedures

Unit: V
Visual Display Units:Asthenopia,Facial rash/Dermatitis
Epilepsy,Radiation
Contact lens and work

Text Books:

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

Reference Books:

G W Good: Occupational Vision Manual available in the following website: www.aoa.org

N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, SafchemServices, 1999

G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

SEMESTER VI
CORE PAPER XV I – 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:

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

Reference books:

Anthony J. Phillips :Contact Lenses, 5thedition, Butterworth-Heinemann, 2006
Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
E S. Bennett ,V A Henry :Clinicalmanual of Contact Lenses, 3rdedition,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 ofthe 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:

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

Refernce Books:

1. Stephen J. Miller :Parsons Diseases of the Eye, 18thedition, ChurchillLivingstone, 1990
2. Jack J. Kanski ClinicalOphthalmology: A Systematic Approach, 6thedition,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 ofageing, 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
NUTRITION

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

Course Objective: At the end of the course student would have gained the knowledge of thefollowing:
Balanced diet.
Protein, carbohydrates, vitamins, Minerals, carotenoids and eye.
Nutrition and Ocular aging
Adverse effects of ocular nutritional supplements

Unit: I
Introduction to Nutrition and Food Science, Food Groups and Food Pyramid Balanced diet for different age groups, Recommended dietary Allowances Assessment of Nutritional Status.

Unit: II
Energy – Units, Metabolisms, Energy expenditure, and Energy imbalance.
Digestion, absorption and transport of Food
Proteins and eye

Unit: III
Lipids and eye
Carbhohydrates and eye
Vitamins and eye

Unit: IV
Minerals and trace elements and eye
Carotenoids and eye
Oxidative stress and the eye

Unit: V
Vitamin A, C and E deficiency
Nutrition and ocular aging

Contraindications, Adverse reactions and ocular nutritional supplements

Text books:

M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore,2004

C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods , National Institute of Nutrition, ICMR, Hyderabad,2004

Frank Eperjesi & Stephen Beatty: Nutrition and the Eye A practical Approach,

ELECTIVE 2-A
COMMUNITY OPTOMETRY

Course Description:Introduction to the foundation and basic sciences of public healthoptometry 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 followingareas:

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:

- 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
- 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

SEMESTER VII

SPECIAL CLINIC I & II

1. Refraction workup sheet
2. Clinical optometry workup
3. Lowvision clinic
4. Contact lens clinic
5. Community ophthalmology
6. Pediatric ophthalmology clinic

SEMESTER VIII

SPECIAL CLINIC III & IV

1. Refractive surgery -LASIK
2. Cataract workup sheet
3. Cornea clinic
4. Orthoptic workupsheet
5. Retina clinic
6. Glaucoma workup

Dr. S. Krishnaveni
Professor
Chairperson, BOS

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

Proceedings of the Meeting of the Board of Studies in B.Sc. (Hons.) (Optometry and Eye Care) (Under Graduate) Specialized Programme offered by Malabar College of Optometry, Nanjanagud held on 27-05-2025 at 11:00 A.M

Members Present :

1. Prof. Krishnaveni	Chairperson
2. Prof. K.P Jayachandran	Member
3. Sri. Syamlal	Member
4. Smt. Lakshmipriya P	Member
5. Smt. Anjali K.P	Member
6. Smt. Sneha M.P	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. Submitting LTP, Syllabus and the Methodology of Assessment and Evaluation for in **B.Sc. (Hons.) (Optometry and Eye Care)** programme as per SEP regulation 2025 onwards.

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

(Prof. 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 Honour's
(Optometry and Eye care)

As per SEP (State Education Policy) Regulations

To be implemented from the Academic year 2025-26

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

I. OBJECTIVES:

B.Sc.(Hons) (Optometry and Eye care) 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.(Hons) (Optometry and Eye care** 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.

Proposed Scheme of Teaching Evaluation for B.Sc. (Hons.)(Optometry and Eye Care)

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	First Language - Paper 1	AECC - 101	3+0+0	80	20	100	3
2	Second Language: English Paper 1	AECC - 102	3+0+0	80	20	100	3
3	Core 1 : Anatomy & Physiology	DSC 101	3+2+0	80	20	100	4
4	Core 2 : Physical Optics	DSC 102	3+2+0	80	20	100	4
5	Complementary Paper 1: Bio Chemistry	DSC 103	3+2+0	80	20	100	4
6	Human Rights	SEC VB	2+0+0	25	25	50	2
	Total Credits			**425**	**125**	**550**	**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	First Language - Paper 2	AECC - 201	3+0+0	80	20	100	3
2	Second Language : English Paper 2	AECC - 202	3+0+0	80	20	100	3
3	Core 3 : Anatomy & Physiology of the Eye	DSC 201	3+2+0	80	20	100	4
4	Core 4 : Geometrical Optics	DSC 202	4+0+0	80	20	100	4
5	Complementary Paper 2: Microbiology	DSC 203	3+2+0	80	20	100	4
6	Women's Rights	SEC VB	2+0+0	25	25	50	2
7	Practical 1 : Physical & Geometrical Optics	OPT P201	0+0+8	50	50	100	4
	Total Credits			**375**	**275**	**650**	**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	First Language - Paper 3	AECC- 301	3+0+0	80	20	100	3
2	Second Language : Communicative English 1	AECC- 302	3+0+0	80	20	100	3
3	Core 5 : Optometric Optics	DSC 301	3+0+0	80	20	100	3
4	Core 6: Visual Optics 1	DSC 302	3+0+0	80	20	100	3
5	Core 7: Optometric and Eye Care Instruments	DSC 303	3+2+0	80	20	100	4
6	Complementary Paper 3 : Pharmacology	DSC 304	3+0+0	80	20	100	3
7	Eye Care	OEC	3+0+0	80	20	100	**3**
	Total Credits			**420**	**280**	**700**	**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	First Language - Paper 4	AECC - 401	3+0+0	80	20	100	3
2	Second Language : Communicative English 2	AECC - 402	3+0+0	80	20	100	3
3	Core 8: Visual Optics 2	DSC 401	3+0+0	80	20	100	3
4	Core 9 : Dispensing Optics	DSC 402	3+2+0	80	20	100	4
5	Core 10 : Systemic Disease	DSC 403	3+0+0	80	20	100	3
6	Complementary Paper 4 : Pathology	DSC 404	3+0+0	80	20	100	3
7	Eye Care in Sports	OEC	3+0+0	80	20	100	3
8	Practical 2: Clinical Optometry and Eye Care 1	OPT P401	0+0+8	50	50	100	4
	Total Credits			**470**	**330**	**800**	**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 502	3+2+0	80	20	100	4
3	Core 13 : Binocular Vision 1	DSC 503	3+2+0	80	20	100	4
4	Core 14 : Low Vision and Eye Care	DSC 504	3+2+0	80	20	100	4
5	Core 15 : Occupational Optometry	DSC 505	3+0+0	80	20	100	3
6	Elective Paper 1 : Community Optometry	OEC 1	3+0+0	80	20	100	3
	Total Credits			**360**	**240**	**600**	**22**

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 : Geriatric & Pediatric Eye Care	DSC 604	3+0+0	80	20	100	3
5	Elective Paper 2 :Environmental studies	OEC 2	3+0+0	80	20	100	3
6	Practical 3 : Clinical Optometry and Eye Care 2	OPT P601	0+0+8	80	20	100	4
7	Project	OPT PJ 601	0+0+6	80	20	100	3

	Total Credits			**420**	**280**	**700**	**25**

Year 4 - Semester VII							
Sl. NO	**Title of Course**	**Category of Courses**	**Teaching Hrs per Week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Core 20 : Special Clinic 1	DSC 701	0+0+20	100	150	250	10
2	Core 21: Special Clinic 2	DSC 702	0+0+20	100	150	250	10
	Total Credits			**200**	**300**	**500**	**20**

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 Clinic 3	DSC 801	0+0+20	100	150	250	10
2	Core 23: Special Clinic 4	DSC 802	0+0+20	100	150	250	10
	Total Credits			**200**	**300**	**500**	**20**

SEMESTER 1

CORE PAPER I - ANATOMY & PHYSIOLOGY

Course Description: General anatomy deals with the entire human anatomy with emphasis ondifferent 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

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

Unit: II

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

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

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

Brain and Cranial nerves:

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

Unit: III

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

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

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. **Applied anatomy &physiology of Nurses,PR Ashalatha,G Deepa**
4. **Manipal manual of Anatomy for Allied health science courses,Sampath madhyastha**
5. **Anatomy and physiology for nurses,JAY PEE BROTHERS**

SEMESTER I

CORE PAPER II – PHYSICAL OPTICS

Course Description: This course will be taught in one semester. Physical Optics is the studyof 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 ofproperties 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.

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: II
Double slits, multiple slits, gratings.

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

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

Scattering; Raleigh's scattering; Tyndall effect.

Fluorescence and Phosphorescence

Unit: IV
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.
3. A Textbook of OPTICS,Dr.N.SUBRAHMANYAM BRIJ LAL,Dr.M. N. Avadhanulu
4. Theory and Practice of OPTICS AND REFRACTION,A.K. KHURANA

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 knowledgeand 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

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

Unit:IV
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
2. D.R. Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heineman
3. **A Textbook of MICROBIOLOGY,Ananthanarayanan and Panickers**

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.

: 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.

: 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 – II
: 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

: 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 cranialnerves 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

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

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
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 illusVisual 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 – GEOMETRIC OPTICS

Course Description: Geometric Optics is the study of light and its behavior as it propagates in avariety 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 ofmirrors 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

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: II

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: III

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: IV

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 Geometric 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. A Textbook of OPTICS,Dr.N.SUBRAHMANYAM BRIJ LAL,Dr.M. N. Avadhanulu
4. Theory and Practice of OPTICS AND REFRACTION,A.K. KHURANA
5. Tunnacliffe A. H, Hirst J. G, *Optics*, The association of British Dispensing Opticians, London, U.K., 1990.

A Textbook of

SEMESTER II
COMPLEMENTARY PAPER II – MICROBIOLOGY

Course Description: This course covers the basic biological, biochemical and pathogeniccharacteristics 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: IV

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 – GEOMETRIC & PHYSICAL 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.

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 II

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.

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

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 -

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